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The Outstanding Characteristics Of  
Children In The Middle Grades.



THE OUTSTANDING CHARACTERISTICS OF CHILDREN  
IN THE MIDDLE GRADES

BY

THEODORE SPAFFORD HENRY

A. B. Hedding College, 1903

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THESIS

Submitted in Partial Fulfillment of the Requirements for the

Degree of

MASTER OF ARTS

IN EDUCATION

IN

THE GRADUATE SCHOOL

OF THE

UNIVERSITY OF ILLINOIS

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UNIVERSITY OF ILLINOIS  
THE GRADUATE SCHOOL

MAY 30, 1916.

I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY SUPER-  
VISION BY THEODORE SPAFFORD HENRY.  
ENTITLED THE OUTSTANDING CHARACTERISTICS OF  
CHILDREN IN THE MIDDLE GRADES.  
BE ACCEPTED AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE  
DEGREE OF MASTER OF ARTS.

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THE OUTSTANDING CHARACTERISTICS OF CHILDREN  
IN THE MIDDLE GRADES.

CHAPTER I.

INTRODUCTION.

Almost universally throughout the United States we find an elementary school system of eight grades, each grade comprising normally the work of one school year. While it is true that in some localities we find deviations from this rule,--that is, elementary school courses of seven or nine years,--and that there is a growing movement to reduce the purely elementary course to six years, placing the last two years in the "junior high school," at present, taking the country throughout, the typical public elementary school system is one of eight grades and eight school years.

A discussion of the merits and demerits of this arrangement does not lie within the province of this study. So far as the eight grades are concerned, they need mention only because of the fact that they serve in helping to locate the field of investigation. My plan is, taking things as they are and the eight grade system for granted, as being the common arrangement, to make a study of the physical and mental characteristics of the children in the intermediate grades of this system. These grades are by definition "the middle grades of the elementary school, always the fourth and fifth, and sometimes inclusive of the third or sixth grades."<sup>1</sup> It is in the latter sense that I am using the term and

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1. Monroe's Cyclopedia of Education, Intermediate Grades, Definition by Henry Suzzallo.



my study, therefore, extends over the third, fourth, fifth, and sixth years of the child's school life.

These four grades have not been arbitrarily selected, but have been chosen with the idea that taken together they form a period which has enough of instinctive importance to make a study of it really worth while. They are looked upon, and dealt with, by school authorities as if naturally belonging together and possessing common characteristics,--in other words, are treated as if forming a natural division of the school course. The following quotation from Bagley is offered in support of the contention that these four grades belong together and may therefore be studied as a period. "Throughout the United States," he says, "the eight grades that commonly comprise the elementary school are divided into three fairly distinct groups. Grades I and II form the 'primary' division, grades III, IV, V, and VI, the 'intermediate' division, and grades VII and VIII the 'grammar' division.. While this grouping was doubtless quite unconscious at the outset, child study has shown that it corresponds very closely to lines of cleavage separating distinct stages of mental and physical growth, and that the three-fold division of the elementary school is really based upon fundamental differences in the capacities and needs of children at different ages."<sup>1</sup>

But granted that these four grades form a natural period, are they still distinctive enough from the other divisions of the course to form a separate object of study? The answer to this involves the much mooted question of periodicity of mental and phys-

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1. Bagley, W. C. The Educative Process, pp. 185-186.



ical growth. The words just quoted from Bagley contain an implication of this theory and I take another quotation from him which puts it in stronger words. "Neither mental nor physical development," he says, "follows the law of uniformly accelerated motion. On the contrary, both are rhythmical, periods of growth being followed by longer or shorter periods of comparative quiescence, and these in turn by shorter or longer periods of growth. So different are the characteristics of both mind and body at successive crests of these developmental waves that some writers have termed the great changes in the child's life 'metamorphoses,' indicating an analogy with the changes exhibited in the development of many lower forms of life and most spectacularly, perhaps, in the development of the typical insect through larval and pupal stages to complete maturity. In so far as the work of the school is concerned, this analogy is hardly overdrawn. The school life of the child presents three distinct phases: (1) the transition stage, from the age of six to the age of eight; (2) the formative stage, from eight to twelve; and (3) the adolescent stage, from twelve to eighteen. These stages are closely connected with the primary, intermediate, and grammar-high school principle of grading. It is true that the dividing lines separating each stage from its predecessor and successor can not be accurately drawn, but it is also true that there is, for each individual child, a change more abrupt than the educator usually recognizes in his practice."<sup>1</sup>

Other writers on education and educational psychology are in harmony with this view. Judd says that "there are nodes or crucial turning points in mental development. Primary grades have a distinct function of their own, upper grades should undoubtedly be

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1. Bagley, W. C. The Educative Process, pp. 186-187.



recognized as characterized by distinct problems. Education is not a monotonous process. There are abrupt transitions, calling for the closest psychological study and insight."<sup>1</sup> Likewise Pyle: "The child passes through various stages of natural interests, when his whole energy seeks an outlet in one direction, and there can be no question of the necessity of taking advantage of these successive waves of natural interests which underlie inherited action."<sup>2</sup> This statement of stages of interest leads up to a summary from Colgrove, which is practically a combination of all these expressions and which serves admirably to sum up this discussion. "Every child passes through certain quite definite stages of development; this development is, in a general way, and with numerous 'short-cuts,' an epitome of the progress of the race; the child's mental and spiritual growth is not a steady and continuous process, but is a rhythmic process consisting of alternating epochs of rapid growth and slow growth, and varies as greatly as does the child's bodily development; throughout this development of the child, new instincts and capabilities are continually cropping out, so to speak, that predispose the mind to receive readily certain kinds of instruction."<sup>3</sup>

It must be admitted that in making such statements as have just been quoted there is great danger of seeming to be dogmatic. it is extremely tempting to try to make generalizations, and the

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1. Judd, C. H. Psychological Characteristics of the Intermediate Grades. School Review Monographs, 3:1-6.

2. Pyle, W. H. The Outlines of Educational Psychology, p. 41.

3. Colgrove, C. P. The Teacher and the School, p. 50.



desire to do so sometimes causes a writer to let his ambition get the better of his reason. Let it be noted then, at the outset, that in this study no attempt will be made to claim any lines of sharp demarcation as separating the middle grades from those immediately above and below them. Nor will any attempt be made to set up the claim that each and every individual child will pass through these different experiences in the same order and duration of time, or that the characteristics which are claimed to be typical of the period will be possessed by all children to the same degree. The most that anyone could claim for such a study would be that an attempt had been made to establish certain norms, types, or modes of growth, thought, and action, which might, with some degree of confidence, be expected to appear in the child within limits of time that, although showing great variation, in the main coincide with the middle four years of the elementary school. And if no more than this can be accomplished, the study may yet be greatly worth while. The attempt is to establish the fact that, in the light of the available evidence, this period has its distinctive features.

Genetic psychology will probably never attain such a degree of scientific accuracy as to render it possible to predict just what any individual child, with his own particular hereditary traits and environmental circumstances, will be at any given year or stage of his life, or how any particular outside influence will affect him. Yet it is possible even at the present time to point out what traits and characteristics are likely to come into prominence at any given period, with sufficient accuracy to be of real assistance to those who deal with the care and training of children. No matter how certain we may become of the principles and progress of



inner development, or of the effects of external conditions, so many are the complicating factors that it will never be possible far in advance to tell just what any child will be, or how he will react to any condition, but this does not mean that we cannot, in a general way, look for certain phenomena at certain stages of development, just as we look ahead to the coming of the different seasons, though we cannot tell what the weather will be on any given date at all distant.<sup>1</sup>

The middle grades form a field that has been almost wholly neglected in educational literature. Kindergarten methods and the work of the primary grades have an extensive literature, and departmental teaching and the discussion of the junior high school project have drawn attention to the upper two grades of the elementary course, but what has been written concerning the intermediate grades has been only incidental to larger discussions. This neglect in theory is reflected in an almost equal neglect in practice. There is plenty of evidence that these grades, historically so important,<sup>2</sup> are not receiving their due share of attention at the hands of educational authorities. "The intermediate grades are a neglected field in educational theory and practice. Primary work has received a great deal of attention, and the upper grades have always been regarded as important; but the intermediate grades have frequently

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1. Kirkpatrick, E. A. *The Individual in the Making*, pp. 62-63.

2. "The common schools of today can be traced back to the writing and reckoning schools established in Massachusetts in 1680. These corresponded approximately to grades 4, 5, and 6. The lower grades, 1, 2, and 3, were not generally added until about 1820. Grades 7 and 8, or work corresponding thereto, were added still later, while the high school was at first merely a further extension of the common schools along the same lines as grades 7 and 8."  
 -----Robinson, E. V. *The Reorganization of the Grades and High School*. *School Review*, 20:665-688 (December, 1912).



been the junk-pile for worn-out, inefficient teachers, the training ground for novices, and the only field absolutely untouched by the rejuvenating spirit of modern methods. And yet the intermediate grades cover the most important formative period of the child's life. \* \* \* \* \* This is the time when the teacher can do most for the child once he understands him; but it is also the time when the child is hardest to understand."<sup>1</sup>

Ruediger and Strayer, in their investigation of the qualities of merit in teachers,<sup>2</sup> found that 28% of the teachers of first rank in merit were teaching in the first grade and 19% in the eighth, making a total of 47% of the first-rank teachers in these two grades. Combining the first and the second with the seventh and the eighth, they found in these four grades 69% of the best teachers, leaving only 31% to be distributed among the other four. The poor teachers were somewhat more evenly distributed. Regarding the two lowest groups as one, they found 57% in the four intermediate grades, as against 43% in the four extreme grades. The fourth and sixth grades together contained 38% of the poor teachers. The distribution of the salaries seemed to have a close correspondence with the distribution of merit in teaching, the salaries making a "saddle-back" curve corresponding to that made by the distri-

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1. Bagley, W. C. Geography in the Intermediate Grades. Montana State Normal College Bulletin, Vol. 5, No. 6. (August, 1904).

Cf. Judd, C. H. Psychological Characteristics of the Intermediate Grades. School Review Monographs, 3:1-6. ----"Most schools do not regard the intermediate grades as of distinct importance in the educational scheme. \* \* \* \* \* They have been final points to which inefficient teachers have been transferred."

2. Ruediger, W. C., and Strayer, G. D. The Qualities of Merit in Teachers. Journal of Educational Psychology, 1:272-278 (September, 1915).



bution of the best teachers.

An investigation by Buellfield, on the causes of failures among teachers, offers evidence corroborative to that already given. He finds that more teachers fail in the fifth grade than in any other, and calls attention to the similarity of his results to those obtained by previous investigators. By way of explanation, he says that "this situation is easily accounted for. School boards and superintendents almost invariably exercise greater care in the selection of teachers for those grades ( i. e. grades 1, 2, 7, and 8) and, as a rule, offer higher salaries to attract stronger teachers to those grades."<sup>1</sup> Evidence of this tendency is also given in a study by Meriam,<sup>2</sup> whose results show that the lower and upper grades have more than their share of teachers rated in the first rank, and that more of the second rank teachers are in grades three to seven.

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1. Buellfield, H. Causes of Failure among Teachers. Educational Administration and Supervision, 1:439-452.

2. Meriam, J. L. Normal School Education and Efficiency in Teaching, p. 111.

"As a rule the best trained teachers, those receiving the highest salaries, should be placed in the lower primary and the upper grammar grades, while the young and inexperienced should be placed in the intermediate." ----- Supt. J. H. Phillips, Birmingham (Ala.) Public Schools. Quoted (with approval) by the Educational Commission of the City of Chicago, Report, 1899, p. 52.

"Your commission believes in employing for each grade of the elementary schools the best teachers available, but it is not at all clear that the teachers of each grade are entitled to the same pay. Some grades, notably the first and second, demand the possession on the part of the teachers of qualifications not to be found in the majority of those giving instruction. In other grades, particularly the seventh and eighth, a more liberal education, wider reading, and more general knowledge are needed, and greater care is necessary in preparation for recitations, as well as more labor in carrying out the course of study." ----- Educational Commission of the City of Chicago, Report, 1899, p. 77.



This much having been said by way of introduction to the main topic, there remains the necessity of more definitely establishing the age-limits of the period under study. Not only do not all pupils enter school at the same age, but it is also a sad fact that not all of them progress at the same rate, hence we have a rather wide distribution of ages within the grade.<sup>1</sup> Ayres, in his study of retardation, establishes his age-grade standards in the following manner: "Now, if children enter the first grade at the age of from six to six and a half and are not retarded during the course their ages in the several grades will be as follows:-

| Grade.              | Age.            |
|---------------------|-----------------|
| First Grade .....   | 6 to 8 years.   |
| Second Grade .....  | 7 to 9 years.   |
| Third Grade .....   | 8 to 10 years.  |
| Fourth Grade .....  | 9 to 11 years.  |
| Fifth Grade .....   | 10 to 12 years. |
| Sixth Grade .....   | 11 to 13 years. |
| Seventh Grade ..... | 12 to 14 years. |
| Eighth Grade .....  | 13 to 15 years. |

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1. "Particularly difficult is the problem in the middle grades of the elementary school, those of the fourth, fifth, and sixth school year. The experience of every teacher demonstrates that here are to be found pupils in three stages---the plateau of childhood, pubescence, and youth. The study of the age tables in any system of schools puts it before us even more clearly. Approximately one third of the pupils in a fifth- or sixth-year class are in the plateau period of childhood. Not only do they merit the treatment appropriate to this period, but to treat them otherwise is to put a distinct strain upon class discipline. In the same room there is approximately another third of pupils who are fully adolescent, and who, in their turn, deserve to have the class exercises conducted in accordance with their peculiar needs. Between these two grades there is that other group of pubescents, whose successful nurture demands the most peculiar skill." ----- Perry, A. C. Discipline as a School Problem, pp. 173-174.



These ages have been accepted by common consent as the 'normal ages' for these grades by nearly all the school men who have interested themselves in the problem."<sup>1</sup>

Much objection has been raised against Ayres's age-grade standards, and of the criticisms offered to it the following may be taken as typical. "The Ayres standard \* \* \* allows an extra year for each grade. Its effect may be to conceal one year of retardation or repetition. On this standard, as applied to the schools of the Middle West, it would be possible for every pupil in the system to enter at six years,--the most frequent entering age,--to repeat a year, and still not be retarded according to the age statistics. \* \* \* Each grade, by definition, means a year's work. Therefore, the child who enters the first grade at six should enter the second at seven, the third at eight, and so on."<sup>2</sup>

Since it is with the normal child of the middle grades, rather than the retarded one, that this study is to deal, this controversy as to age-grade standards is not important to us. Considering the normal child as entering the first grade at six and making regular progress throughout the course, the age of eight would find him entering the third grade, and at twelve he would have finished the sixth. Eight and twelve, then, are the ages which I have fixed upon as marking the limits of that period of the child's life which in the following pages I am to attempt to describe. It will be noted that in adopting these age-limits, I am in agreement both

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1. Ayres, L. P. Laggards in our Schools, A Study of Retardation and Elimination in City School Systems, p. 38.

2. Henmon, V. A. C. Retardation, Acceleration, and Class Standing, Elementary School Teacher, 14:283-294 (February, 1914).



with Ayres and his critics as to the time of entering the third grade, and differ from Ayres in the upper limit of the sixth grade age by only one year. Of course it is not maintained that there is any sharply marked distinction between the twelfth and thirteenth year of age in individual cases, and for all practical purposes one year would make as satisfactory a limit as the other.

Combining the definition of the intermediate grades already given (page 1) with this age-grade standard, I may restate my problem as a study of the outstanding characteristics of children between the chronological ages of eight and twelve. I shall first take up a discussion of the physiological features of the period and follow that with a study of the psychological characteristics, based upon experimental evidence. This, in turn, will be followed by a chapter treating of some of the more general conditions and attitudes, a review of several of the more important attempts to characterize the period as a whole, and, in conclusion, a chapter summarizing the conclusions reached on the basis of the investigation.



## CHAPTER II.

## PHYSIOLOGICAL CHARACTERISTICS.

Although the authorities are not in complete accord upon the question, the preponderance of evidence seems to show that at about the time when the child enters the third grade of the public schools, he is undergoing a transition period of such marked character and importance that by some it has been called the "fatigue period."<sup>1</sup> The time of the approach of this period varies greatly in the case of individual children, but in the main it may be located between the ages of seven and nine, showing as much variation in its length as in the time of its appearance. This period of transition is accompanied by various disturbances, many of which are no doubt related to the second dentition, with its underlying physiological accompaniments and its indirect effect of bad nutrition through improper mastication.<sup>2</sup>

At the same time there occurs a change in the vascular system which is likely to produce such symptoms as shortness of breath and susceptibility to fatigue,--conditions which are, indeed, common throughout this period. These are caused by a cardiac incom-

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1. Christopher, W. S. Three Crises in Child Life. Child Study Monthly, 3:324-335 (1897).

2. "There is a general increase in the percentage of decayed teeth up to ten years of age, and then a quick drop during the next two years. Children between eight and nine have about one half of their baby teeth still in the mouth, most of which are in bad condition. At ten years of age most of the baby teeth have given place to the new permanent teeth, and at eleven years of age children enjoy the greatest immunity from diseased teeth of any period in life after the fourth year." ----- Johnson, G. E. The Condition of the Teeth of Children in Public Schools. Pedagogical Seminary, 8:45-58 (March, 1901).



petence, which, in turn, is due to the fact that at this time increase in weight of body is not met by adequately corresponding increase in the size of the heart muscle.<sup>1</sup> "At eight or nine there is quite a change in the circulatory system, resulting in the veins and arteries being proportionately larger than the heart. The second dentition now takes place, the senses are perfected, the brain ceases almost entirely to grow (and continues to develop in complexity), having attained almost its full weight. Children at this period are subject to a number of not generally recognized physical and physiological dangers, such as difficulties of dentition, dental diseases, toothache, indigestion, rapid fatigue, tendencies toward heart weaknesses."<sup>2</sup>

In his studies on the mental and physical development of school children, Gilbert<sup>3</sup> found that fatigue, as measured by a decrease in the tapping rate after tapping 45 seconds, showed a marked increase between the ages of seven and eight, the age of

1. Bryan, E. B. The Basis of Practical Teaching, pp. 161-163, 167-168.

Chamberlain, A. F. The Child, A Study in the Evolution of Man, p. 74.

Groszmann, M. P. E. The Career of the Child, p. 73.

Hall, G. S. The Ideal School as Based on Child Study. Addresses and Proceedings of the N. E. A., 1901, pp. 474-488.

Rowe, S. H. The Physical Nature of the Child and How to Study It, p. 129.

2. Doll, E. A. Mental and Physical Development of Normal Children. Training School Bulletin, 10:113-120 (December, 1913).

3. Gilbert, J. A. Researches on the Mental and Physical Development of School Children. Studies from the Yale Psychological Laboratory, 2:40-100 (November, 1894).



eight standing at a high point of the curve. In commenting upon this experiment Claparède says: "The variation of fatigue according to age has been investigated in schools, by Gilbert, by the method of taps. \* \* \* \* **Fatigability** decreases with age, but the curve of this decrease is not regular; it rises abruptly at eight years, at thirteen to fourteen years, and at sixteen years. We know what this means: at these epochs there is an acceleration of growth, and the available energy being diminished, fatigability is augmented."<sup>1</sup>

Whatever explanation of the causes of the symptoms peculiar to this period may seem most reasonable, the evidence as to the fact of its existence is sufficient to warrant the assertion that the years marking the beginning of the middle grades of the elementary school are years of disturbance. In many cases this particular stage of growth will have been finished before the child enters the third grade, but there will be a goodly proportion of children in that grade who will be still in this stage of transition, and it is necessary for the successful teacher to take these things into account. Too little attention thus far has been paid to conditions that are "natural." Such symptoms as have been described are looked upon as matters of course. They are too common to attract any attention and there is great danger that these common symptoms may serve to hide from the careless observer conditions which are not so common, and which may be of great moment in their effect upon the future health of the child.

Once past this period, which may be of longer or shorter

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1. Claparède, É. Experimental Pedagogy and the Psychology of the Child. Trans. by Louch and Holman, p. 250.

Tyler, J. M. Growth and Education, p. 71.



duration, the child enters upon another stage of life which, in its turn, has marked characteristics of its own. This new period is longer in its duration than the one which has just been discussed, and is that period which forms the subject of the main part of this study. A more extended study of its characteristics will therefore be necessary.

Much difficulty is encountered in attempting to evaluate and interpret statistics of growth, as expressed in tables of measurements. Much of the work has been done under conditions of a nature such as to give occasion for great doubt as to the correctness or validity of the results, and, even in the case of the more careful and exact investigations, factors have been allowed to enter which make exact comparison difficult, if not wholly impossible. Probably of all the tables of height and weight that have been published, the best for the purposes of the educational investigator are those published by Burk.<sup>1</sup> Burk's table for height was calculated by Dr. Franz Boaz from figures obtained in five large special studies<sup>2</sup> including in all, 45,151 boys and 43,298 girls in Boston,

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1. Burk, F. Growth of Children in Height and Weight. American Journal of Psychology, 9:253-326 (April, 1898).

"The most complete and significant table of growth so far published for general purposes is that by Burk, based on Boas's data for height, and data from Bowditch, Peckham, and Porter for weight."  
----- Baldwin, B. T. Physical Growth and School Progress. U. S. Bureau of Education, Bulletin 1914, No. 10, p. 149.

2. Bowditch, H. P. The Growth of Children. Eighth Annual Report, Massachusetts State Board of Health.

Porter, W. T. Growth of St. Louis Children. Report, Academy of Science of St. Louis, Vol. 6, pp. 263-380.

Peckham, G. W. The Growth of Children. Sixth Annual Report, Wisconsin State Board of Health.

West, G. M. Anthropometrische Untersuchungen über die Schulkinder in Worcester, Mass. Archiv f. Anthropologie, 22:13-48 (1894).



Saint Louis, Milwaukee, Worcester, Toronto, and Oakland. In the reproduction of this table below I have, for purposes of comparison, given in connection with it the figures of two other investigators, --Smedley and Baldwin. Smedley's figures were obtained from the measurement of 2,788 boys and 3,471 girls of the Chicago public schools.<sup>1</sup> Baldwin derives his results from the recorded measurements of 501 boys and 706 girls of the University Elementary School and the Francis W. Parker School, both also in Chicago.<sup>2</sup> Although these tables extend in years of age beyond the limits of my study, I am giving the complete table in each case, in order that this particular period may be the more readily compared with others.

Average Height (in Inches) of American Children.<sup>3</sup>

| Approximate<br>average age<br>in years. | Burk. |        | Smedley. |        | Baldwin (Median). |        |
|-----------------------------------------|-------|--------|----------|--------|-------------------|--------|
|                                         | Boys. | Girls. | Boys.    | Girls. | Boys.             | Girls. |
| 5.5                                     | 41.7  | 41.3   |          |        |                   |        |
| 6.5                                     | 43.9  | 43.3   | 44.6     | 44.3   | 46.9              | 46.2   |
| 7.5                                     | 46.0  | 45.7   | 46.6     | 46.5   | 49.2              | 48.4   |
| 8.5                                     | 48.8  | 47.7   | 48.6     | 48.3   | 51.5              | 49.7   |
| 9.5                                     | 50.0  | 49.7   | 50.7     | 50.3   | 52.7              | 51.5   |
| 10.5                                    | 51.9  | 51.7   | 52.4     | 52.2   | 54.7              | 54.2   |
| 11.5                                    | 53.6  | 53.8   | 54.0     | 54.4   | 55.9              | 56.6   |
| 12.5                                    | 55.4  | 56.1   | 55.9     | 56.8   | 57.9              | 58.1   |
| 13.5                                    | 57.5  | 58.5   | 58.7     | 59.5   | 59.8              | 60.9   |
| 14.5                                    | 60.0  | 60.4   | 60.9     | 61.5   | 62.6              | 62.0   |
| 15.5                                    | 62.9  | 61.6   | 63.5     | 61.9   | 64.7              | 62.6   |
| 16.5                                    | 64.9  | 62.2   | 65.6     | 62.7   | 65.5              | 63.0   |
| 17.5                                    | 66.5  | 62.7   | 66.6     | 62.8   | 66.5              | 63.4   |
| 18.5                                    | 67.4  |        | 68.3     | 62.8   |                   |        |

Boas, F. The Growth of Toronto Children. Report U. S. Commissioner of Education, 1896-1897, pp. 1541 ff.

1. Smedley, F. W. Report to Committee on Child Study and Pedagogic Investigation. Forty-sixth Annual Report of the Board of Education, Chicago, 1900, pp. 47-116.

2. Baldwin, B. T. Physical Growth and School Progress. U. S. Bureau of Education, Bulletin 1914, No. 10.

3. Smedley, op. cit., p. 53. Baldwin, op. cit., p. 22. Although the figures of these three investigators are comparable for all practical purposes, they are not strictly so. The measure-



More significant for the present purpose, however, are the following tables, the first of which shows the annual absolute increase in average height; the second, the same reduced to a percentage.

Average Annual Increase in Height (Inches).<sup>1</sup>

| Year of age. | Burk. |        | Smedley. |        | Baldwin. |        |
|--------------|-------|--------|----------|--------|----------|--------|
|              | Boys. | Girls. | Boys.    | Girls. | Boys.    | Girls. |
| 5.5-6.5      | 2.2   | 2.0    |          |        |          |        |
| 6.5-7.5      | 2.1   | 2.4    | 2.0      | 2.2    | 2.3      | 2.2    |
| 7.5-8.5      | 2.8   | 2.0    | 2.0      | 1.8    | 2.3      | 1.3    |
| 8.5-9.5      | 1.2   | 2.0    | 2.1      | 2.0    | 1.2      | 2.2    |
| 9.5-10.5     | 1.9   | 2.0    | 1.7      | 1.9    | 2.0      | 2.7    |
| 10.5-11.5    | 1.7   | 2.1    | 1.6      | 2.2    | 1.2      | 2.4    |
| 11.5-12.5    | 1.8   | 2.3    | 1.9      | 2.4    | 2.0      | 1.5    |
| 12.5-13.5    | 2.1   | 2.4    | 2.8      | 2.7    | 2.1      | 2.8    |
| 13.5-14.5    | 2.5   | 1.9    | 2.2      | 2.0    | 2.8      | 1.1    |
| 14.5-15.5    | 2.9   | 1.2    | 2.6      | .4     | 2.1      | .6     |
| 15.5-16.5    | 2.0   | .6     | 2.1      | .8     | .8       | .4     |
| 16.5-17.5    | 1.6   | .5     | 1.0      | .1     | 1.0      | .4     |
| 17.5-18.5    | .9    |        | 1.5      |        |          |        |

ments which supplied the data for the tables of Burk and Baldwin were taken without shoes. Smedley calipered the heels of the shoes and subtracted the height of the shoe heels from the gross height. "This, upon trial, proved almost identical with the height when taken without shoes." (Page 58). Baldwin used the median of his measurements. Burk's and Smedley's figures are the averages. Smedley says (p. 48) that the differences between averages and medians proved insignificant. Burk's age figure represents the "approximate average age", that is, the center of the distribution over the year. Smedley, by calculating daily and monthly increments, reduced his figures to norms computed to integral years and half-years. (Page 50). Baldwin's measurements include consecutive records of each individual, to the number of three or more (in some cases there were twelve), and his table is so arranged that "no measurement is more than three months from the exact chronological age" (pp. 11-13).

1. Burk's figures are taken from his own table. The figures for Smedley and Baldwin I have calculated from their figures as given in the preceding table. And so for the table of per cent increase.



## Average Annual Per Cent Increase in Height.

| Year of age. | Burk. |        | Smedley. |        | Baldwin. |        |
|--------------|-------|--------|----------|--------|----------|--------|
|              | Boys. | Girls. | Boys.    | Girls. | Boys.    | Girls. |
| 5.5-6.5      | 5.3   | 4.8    |          |        |          |        |
| 6.5-7.5      | 4.8   | 5.5    | 4.5      | 4.9    | 4.9      | 4.7    |
| 7.5-8.5      | 6.1   | 4.4    | 4.3      | 3.9    | 4.7      | 2.7    |
| 8.5-9.5      | 2.5   | 4.2    | 4.3      | 4.1    | 2.3      | 4.4    |
| 9.5-10.5     | 3.8   | 4.0    | 3.4      | 3.8    | 3.8      | 5.2    |
| 10.5-11.5    | 3.3   | 4.1    | 3.0      | 4.2    | 2.2      | 4.4    |
| 11.5-12.5    | 3.4   | 4.3    | 3.5      | 4.4    | 3.6      | 2.6    |
| 12.5-13.5    | 3.8   | 4.3    | 5.0      | 4.7    | 3.6      | 4.8    |
| 13.5-14.5    | 4.3   | 3.2    | 3.7      | 3.4    | 4.7      | 1.8    |
| 14.5-15.5    | 4.8   | 2.0    | 4.3      | .6     | 3.3      | .9     |
| 15.5-16.5    | 3.2   | 1.0    | 3.3      | 1.3    | .1       | .6     |
| 16.5-17.5    | 2.5   | .8     | 1.5      | .2     | .1       | .6     |
| 17.5-18.5    | 1.4   |        | 2.4      |        |          |        |

It will be seen upon examining this table that although there are variations in the results obtained by different investigators the same general tendency is exhibited. The most marked exceptions are found in Baldwin's figures for girls, which are in direct contradiction to those of both Burk and Smedley and which really show such irregularity that no generalization can well be made from them. With the exception just noted, the years between eight and one half and eleven and one half are shown to form a period of relatively slow growth in height for both boys and girls and, likewise, the year of slowest rate before the decline after adolescence falls within this period.

To obtain his table of average weight, Burk threw together the results of the investigations by Bowditch, Porter, and Peckham,<sup>1</sup> thus including the weights of some 24,500 children of Boston, 34,500 children of Saint Louis, and 9,600 children of Milwaukee, making a total, in round numbers, of 69,000. I give his table compared, as in the case of his table of height, with figures by

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1. See above, page 15, note 2.



Smedley and Baldwin. Smedley's figures include the same children as do his figures for height. Baldwin's results are based on 460 boys and 638 girls from the same schools from which he obtained his figures for height and probably, though not necessarily, include mainly the same individuals. This table will also be followed by tables of average annual increase and increase per cent.

Average Weight (in Pounds Avoirdupois) of American Children.<sup>1</sup>

| Approximate<br>average age<br>in years. | Burk. |        | Smedley. |        | Baldwin (Median). |        |
|-----------------------------------------|-------|--------|----------|--------|-------------------|--------|
|                                         | Boys. | Girls. | Boys.    | Girls. | Boys.             | Girls. |
| 6.5                                     | 45.2  | 43.4   | 45.6     | 43.9   | 51.0              | 46.8   |
| 7.5                                     | 49.5  | 47.7   | 49.7     | 48.6   | 56.2              | 49.0   |
| 8.5                                     | 54.5  | 52.5   | 55.3     | 52.9   | 60.0              | 55.6   |
| 9.5                                     | 59.6  | 57.4   | 60.8     | 58.5   | 62.5              | 59.3   |
| 10.5                                    | 65.4  | 62.9   | 65.8     | 64.1   | 68.8              | 65.8   |
| 11.5                                    | 70.7  | 69.5   | 71.9     | 71.1   | 72.7              | 72.5   |
| 12.5                                    | 76.9  | 78.7   | 78.7     | 80.5   | 77.8              | 83.0   |
| 13.5                                    | 84.8  | 88.7   | 89.3     | 91.4   | 87.0              | 95.0   |
| 14.5                                    | 95.2  | 98.3   | 99.0     | 103.6  | 102.5             | 103.5  |
| 15.5                                    | 107.4 | 106.7  | 112.6    | 108.8  | 108.5             | 111.2  |
| 16.5                                    | 121.0 | 112.3  | 122.2    | 114.6  | 114.5             | 112.5  |
| 17.5                                    |       | 115.4  | 130.9    | 116.4  | 128.5             | 116.5  |
| 18.5                                    |       | 114.9  | 135.1    | 116.9  |                   |        |

Average Annual Increase in Weight (Pounds).<sup>2</sup>

| Year of age. | Burk. |        | Smedley. |        | Baldwin. |        |
|--------------|-------|--------|----------|--------|----------|--------|
|              | Boys. | Girls. | Boys.    | Girls. | Boys.    | Girls. |
| 6.5-7.5      | 4.3   | 4.3    | 4.1      | 4.7    | 5.2      | 2.2    |
| 7.5-8.5      | 5.0   | 4.8    | 5.6      | 4.3    | 3.8      | 6.6    |
| 8.5-9.5      | 5.1   | 4.9    | 5.5      | 5.6    | 2.5      | 3.7    |
| 9.5-10.5     | 5.8   | 5.5    | 5.0      | 5.6    | 6.3      | 6.5    |
| 10.5-11.5    | 5.3   | 6.6    | 6.1      | 7.0    | 3.9      | 6.7    |
| 11.5-12.5    | 6.2   | 9.2    | 6.8      | 9.4    | 5.1      | 10.5   |
| 12.5-13.5    | 7.9   | 10.0   | 10.6     | 10.9   | 9.2      | 12.0   |
| 13.5-14.5    | 10.4  | 9.6    | 9.7      | 12.2   | 15.5     | 8.5    |
| 14.5-15.5    | 12.2  | 8.4    | 13.6     | 5.2    | 6.0      | 7.7    |
| 15.5-16.5    | 13.6  | 5.6    | 9.6      | 5.8    | 6.0      | 1.3    |
| 16.5-17.5    |       | 3.1    | 8.7      | 2.2    | 14.0     | 4.0    |
| 17.5-18.5    |       |        | 4.2      | .5     |          |        |

1. See above, page 16, note 3. Burk's and Smedley's figures include weight of clothing. Baldwin's do not.

2. Note 1, page 17 (above) applies to this table and the one immediately following.



Average Annual Per Cent Increase in Weight.<sup>1</sup>

| Year of age. | Burk. |        | Smedley. |        | Baldwin. |        |
|--------------|-------|--------|----------|--------|----------|--------|
|              | Boys. | Girls. | Boys.    | Girls. | Boys.    | Girls. |
| 6.5-7.5      | 9.5   | 9.9    | 8.8      | 10.7   | 10.2     | 4.7    |
| 7.5-8.5      | 10.1  | 10.0   | 11.3     | 8.8    | 6.8      | 13.5   |
| 8.5-9.5      | 9.3   | 9.3    | 9.9      | 10.6   | 4.1      | 6.6    |
| 9.5-10.5     | 9.7   | 9.6    | 8.2      | 9.6    | 10.1     | 10.9   |
| 10.5-11.5    | 8.1   | 10.5   | 9.3      | 10.9   | 5.7      | 10.2   |
| 11.5-12.5    | 8.7   | 13.2   | 9.4      | 13.4   | 7.0      | 13.1   |
| 12.5-13.5    | 10.3  | 12.7   | 13.4     | 13.7   | 11.8     | 14.7   |
| 13.5-14.5    | 12.3  | 11.9   | 10.9     | 13.5   | 17.8     | 9.9    |
| 14.5-15.5    | 12.8  | 8.5    | 13.7     | 5.0    | 5.8      | 7.4    |
| 15.5-16.5    | 12.7  | 5.2    | 8.5      | 5.3    | 5.5      | 1.1    |
| 16.5-17.5    |       | 2.8    | 7.1      | 1.1    | 12.2     | 3.5    |
| 17.5-18.5    |       |        | 3.2      | .4     |          |        |

1. Some doubt as to the value of tables such as this and the others here presented has been expressed, on the ground that the only valid way of arriving at a proper measure of rate of growth would be to measure a group of the same individuals at annual intervals. Typical of such criticisms is the following: "The assumption is that the difference between the average heights of six year and seven year old boys represents the average growth for one year. This is not necessarily the case, unless the same set of boys were measured after an interval of a year. The seven-year-olds are less numerous than the six-year-olds because some of the six-year-olds have died before the age of seven is reached. The result is unaltered if the children who die are of normal height. If they are taller than the average, the registered growth for the year is too small; if they are smaller, the result is too great. There is some ground for believing that the latter condition usually holds." ----- Sandiford, P. The Mental and Physical Life of School Children, p. 31.

With this, compare the following: "It is not assumed that a single child grows at exactly the same regular movement upward as is shown by the tables and charts, yet it is believed that ordinarily children do not differ widely from this rate, and the average of a small number of the same class of boys and girls taken from year to year would give us figures almost identical with the results of these compilations. So these tables fairly show laws of growth and physical development.

There is a prevalent belief, growing out of the evolutionary doctrine of the survival of the fittest, that the average represents the ideal type. As these measurements must include many imperfect specimens, children who, through disease, malnutrition, and other insalutary conditions, have failed to attain the growth and development that they otherwise would have reached, in all probability the evolutionary ideal type will be found somewhat above the average in each measurement."-----Smedley, F. W. Report to Committee on Child Study and Pedagogic Investigation. Forty-sixth Annual Report of the Board of Education, Chicago, 1900, p. 49.



As was the case with the figures for height, those for weight are not in complete agreement. Burk's show a marked decrease for both sexes for the year beginning at eight and one half and a marked increase for the year beginning at eleven and one half. Smedley agrees fairly well for the boys, but the tendency is not so well marked for the girls. Yet for them his table shows a decrease at nine and one half and a rise at the same time as the one shown by Burk. Baldwin's figures are, as before, more irregular. But it will be seen that he shows a decrease in the first year of the period and an increase in the year following it, in the case of both boys and girls.

For purposes of comparison, as well as to illustrate the general tendency, I have brought together in the following table the results of these investigations as showing the year of smallest per cent of increase in height and weight before adolescent growth begins, which, of course, is followed by years of still smaller growth, as the body approaches maturity.

Year of Smallest Per Cent Increase in Height.

|        | Burk.    | Smedley.  | Baldwin.  |
|--------|----------|-----------|-----------|
| Boys.  | 8.5-9.5  | 10.5-11.5 | 10.5-11.5 |
| Girls. | 9.5-10.5 | 9.5-10.5  | 11.5-12.5 |

Year of Smallest Per Cent Increase in Weight.

|        | Burk.     | Smedley. | Baldwin.             |
|--------|-----------|----------|----------------------|
| Boys.  | 10.5-11.5 | 9.5-10.5 | 8.5-9.5              |
| Girls. | 8.5-9.5   | 7.5-8.5  | 6.5-7.5 <sup>1</sup> |

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1. There is such irregularity in Baldwin's figures that it might have been just as well to put here the year 8.5-9.5, which ranks second from the lowest in his table.



In spite of the differences that have already been pointed out, the results of these investigations upon the growth of children afford substantial evidence that the years of age between eight and twelve go to make up a period in which growth exhibits a relatively slow and steady uniformity, so that a "plateau" is formed, as contrasted with the preceding stage where growth was rapid up to the age of eight or nine. This is more clearly shown by Burk's results than by the others, and, because of the much larger number of cases upon which his figures are based, and the geographical distribution of the studies from which the data were obtained, Burk's tables are more nearly representative of actual conditions than are any others that we have.

Where these tables begin (six or seven years of age), rate of growth is somewhat rapid. There then comes a decrease, with fluctuations, until about ten in girls and twelve in boys, where the prepubertal acceleration sets in. In the case of the boys there is to be seen a general rising tendency in increase of weight, culminating usually somewhere about the ninth year, when the rate of increase suffers a sharp drop, falling to its lowest point just before the prepubertal increase. On the whole, then, the period from seven or eight to ten or eleven for girls and to twelve for boys is a period of general decrease in the rate of growth. Just before the adolescent acceleration begins, therefore, there seems to be a pause where growth sinks to a minimum; then all of a sudden growth becomes more rapid until about fifteen years of age. As far as physical growth, then, is concerned, the period of the middle grades lies on a plateau between two rather rapidly rising curves.<sup>1</sup>

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1. Burk, F. Growth of Children in Height and Weight. Amer-



"It is quite remarkable," says Hall, "that whether individuals or large groups are studied, the main characteristics of the curves of growth remain the same for both height and weight, so that we have the following established results: first, as shown in every study since Quetelet, a marked prepubescent acceleration in both height and weight; second, precedence of girls in this accelerated growth by a year or two<sup>1</sup>; third, a period of slightly diminished growth centering about the ages from eight to nine to ten or eleven; fourth, a gradual and probably irregular tapering off of growth in height at about eighteen, and to a degree, of weight a few years later, concerning which much remains to be learned; and, fifth, as shown in many but not in all these studies, a very slight retardation near the period of school entrance with an acceleration shortly after. \* \* \* Many studies show a diminished rate of growth in height and weight during a few years preceding adolescence. \* \* \* Nearly all the best researches reveal this diminished rate of growth in height and also in weight. Even though the absolute increment is maintained during these minimal years, the percentage rate is usually diminished. The same retardation is also manifest in nearly

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ican Journal of Psychology, 9:253-326 (April, 1898).

Baldwin, B. T. Physical Growth and School Progress. U. S. Bureau of Education, Bulletin 1914, No. 10, pp. 23, 30, 40-42, 82.

Claparède, E. Experimental Pedagogy and the Psychology of the Child. Trans. by Louch and Holman, p. 104.

Bagley, W. C. The Educative Process, p. 190.

Perry, A. C. Discipline as a School Problem, p. 116.

Tyler, J. M. Growth and Education, p. 67.

1. Reference to the tables on pages 16 and 19 (above) will show complete agreement among the three investigations as to the circumstances that at the age of 11.5 the girls surpass the boys in height and a year later surpass them in weight.



all returns for weight, although it cannot be determined whether height or weight has precedence in this retardation, and this holds for individual as well as mass measurements."<sup>1</sup>

Passing to features of growth other than height and weight, the following table of chest-girth, taken from Rowe<sup>2</sup>, shows the average girth of chest midway between expiration and inspiration for each age, also the absolute annual increase and the percentage annual increase. The table is based on Porter's measurements of about 30,000 Saint Louis children, and the chest-girth of each child was obtained by adding the girth at full inspiration to the girth at full expiration and dividing by two.

Average Chest Girth (Inches).

| Boys.               |                   |                       |            | Girls.            |                       |            |
|---------------------|-------------------|-----------------------|------------|-------------------|-----------------------|------------|
| Approx.<br>av. age. | Av. each<br>year. | Abs. an.<br>increase. | %<br>Incr. | Av. each<br>year. | Abs. an.<br>increase. | %<br>Incr. |
| 6                   | 23.2              |                       |            | 23.0              |                       |            |
| 7                   | 23.9              | .7                    | 2.7        | 23.4              | .4                    | 1.9        |
| 8                   | 24.5              | .6                    | 2.6        | 23.9              | .5                    | 2.3        |
| 9                   | 25.2              | .7                    | 2.8        | 24.6              | .7                    | 2.8        |
| 10                  | 25.8              | .6                    | 2.6        | 24.8              | .2                    | .8         |
| 11                  | 26.5              | .7                    | 2.5        | 25.9              | 1.1                   | 4.5        |
| 12                  | 27.1              | .6                    | 2.3        | 26.9              | 1.0                   | 3.8        |
| 13                  | 27.8              | .7                    | 2.7        | 28.1              | 1.2                   | 4.3        |
| 14                  | 28.9              | 1.1                   | 3.8        | 28.8              | .7                    | 4.0        |
| 15                  | 30.2              | 1.3                   | 4.5        | 30.2              | 1.4                   | 3.6        |
| 16                  | 31.2              | 1.0                   | 3.5        | 31.0              | .8                    | 2.7        |
| 17                  | 32.0              | .8                    | 2.7        | 31.7              | .7                    | 2.0        |
| 18                  | 33.3              | 1.2                   | 3.8        | 31.7              |                       |            |

The accompanying table of average lung capacity is composed of figures by Baldwin<sup>3</sup> and Smedley.<sup>4</sup>

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1. Hall, G. S. Adolescence; Its Psychology, Vol. I, pp. 14-15, 23.

2. Rowe, S. H. The Physical Nature of the Child and How to Study It, p. 126.

3. Baldwin, op. cit., pp. 110, 117. Baldwin's figures here are



## Average Lung Capacity (Cubic Inches).

| Age. | Baldwin. |        | Smedley. |        |
|------|----------|--------|----------|--------|
|      | Boys.    | Girls. | Boys.    | Girls. |
| 6.5  |          |        | 66.9     | 61.4   |
| 7.5  | 82.4     | 77.9   | 75.7     | 68.1   |
| 8.5  | 92.6     | 83.5   | 84.9     | 74.0   |
| 9.5  | 105.9    | 91.7   | 94.4     | 82.8   |
| 10.5 | 123.2    | 106.7  | 101.2    | 89.1   |
| 11.5 | 126.2    | 119.0  | 110.2    | 97.1   |
| 12.5 | 138.7    | 135.1  | 119.6    | 105.9  |
| 13.5 | 152.9    | 147.7  | 137.7    | 117.0  |
| 14.5 | 173.8    | 158.8  | 154.5    | 128.7  |
| 15.5 | 210.0    | 172.6  | 174.4    | 135.7  |
| 16.5 | 242.6    | 178.8  | 206.0    | 141.8  |

As is shown by the above tables, there seems to be a marked increase in chest-girth for girls at about eleven. It also appears that for boys growth of lung capacity, after showing rapid increase between six and ten, slackens during the next two or three years.<sup>1</sup> In general, the years between eight and twelve form a period of development of the heart and organs of respiration. The lungs undergo a steady, though somewhat slow, growth and the heart muscle increases in size proportionately to the size of the body.<sup>2</sup>

As a result of the slow and steady growth of the body and its internal organs during this period, there is an excess of energy, a certain amount of which is set free for purposes other than the formation of new tissues so that the child probably has more energy

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averages. They were obtained from the measurements of two groups of fifty individuals each. These groups overlapped in such a way that two averages (one for each group) are given for the age 12.5. The figures for that age in the above table are the averages of these two group averages.

4. Smedley, F. W. Op. cit., p. 53.

1. Tyler, J. M. Growth and Education, pp. 64, 83.

2. Crosswell, T. R. Amusements of Worcester School Children. Pedagogical Seminary, 6:314-371 (September, 1899).

Bryan, E. B. The Basis of Practical Teaching, p. 171.



at his disposal, in proportion to his weight, than at any other time.<sup>1</sup> This excess of energy has its influence upon the characteristic games of the period, which are such as to call for vigorous physical exercise, such as running, jumping, and the like, and it is compensated for by increased power to resist fatigue.<sup>2</sup> The peculiar compactness and sturdiness of the body at this time may account for the increased power to resist disease, which is one of the characteristics of the period.<sup>3</sup>

Evidence as to the truth of this last statement is obtained from a table constructed by Dr. E. M. Hartwell of Boston, based upon the mortality returns of that city for 1875, 1885, and 1890. He estimates that what he calls "specific life-intensity" (capacity to resist disease) varies as follows:<sup>4</sup>

Specific life-intensity.

| Age.  | Girls. | Boys. |
|-------|--------|-------|
| 5-6   | 60.08  | 67.3  |
| 6-7   | 69.5   | 74.5  |
| 7-8   | 103.8  | 106.8 |
| 8-9   | 123.2  | 164.0 |
| 9-10  | 195.4  | 134.8 |
| 10-11 | 191.2  | 209.3 |
| 11-12 | 309.0  | 233.2 |
| 12-13 | 232.0  | 290.1 |
| 13-14 | 162.0  | 238.7 |
| 14-15 | 171.3  | 250.1 |
| 15-16 | 169.3  | 188.1 |

1. Bagley, W. C. The Educative Process, p. 190.

2. Crosswell, T. R. Op. cit.

3. Hall, G. S. The Ideal School as Based on Child Study. Addresses and Proceedings of the N. E. A., 1901, 474-488.

Cf. Bagley, W. C. Geography in the Intermediate Grades. Montana State Normal College Bulletin, Vol. 5, No. 6 (August, 1904). ----- "During this period, the child has more energy at his disposal in proportion to his weight than at any other time, and he has the greatest power to resist fatigue and disease."

4. A similar condition is indicated by the figures of the



What this table shows is that girls from eleven to twelve years of age and boys from twelve to thirteen are better able to resist disease than at any other time, so that the period just before adolescence is the healthiest time of life. The increase in power of resistance is, however, not so marked with boys as with girls.<sup>1</sup>

A general summary of the rate of increase in size and strength is afforded by the accompanying tables of average annual per cent of gain, the figures for which are obtained from Smedley.<sup>2</sup>

Annual Rate Per Cent of Increase, Boys.

| Yr. of Age. | Height. | Weight. | Ergo-graph. | R. H. Grip. | L. H. Grip. | Vital Capacity. |
|-------------|---------|---------|-------------|-------------|-------------|-----------------|
| 6-7         | 4.63    | 9.50    | 39.62       | 16.61       | 19.22       | 14.17           |
| 7-8         | 4.40    | 10.20   | 26.24       | 15.55       | 15.43       | 12.67           |
| 8-9         | 4.30    | 10.57   | 21.34       | 15.55       | 15.42       | 11.62           |
| 9-10        | 3.77    | 9.00    | 17.56       | 15.20       | 15.73       | 9.12            |
| 10-11       | 3.20    | 8.76    | 14.46       | 14.10       | 13.66       | 8.04            |
| 11-12       | 3.27    | 9.37    | 12.68       | 12.67       | 11.23       | 8.71            |
| 12-13       | 4.29    | 11.51   | 15.98       | 15.06       | 14.20       | 11.95           |
| 13-14       | 4.39    | 12.11   | 19.29       | 16.28       | 12.03       | 13.61           |
| 14-15       | 4.04    | 12.40   | 19.74       | 17.44       | 17.77       | 12.60           |
| 15-16       | 3.70    | 10.92   | 17.23       | 17.90       | 17.84       | 15.68           |
| 16-17       | 2.32    | 7.78    | 12.59       | 13.38       | 12.55       | 11.63           |
| 17-18       | 2.01    | 6.80    | 9.52        | 10.14       | 9.88        | 4.93            |

following table, which, although not arranged by years as is the one above, clearly enough shows the general tendency.

Deaths by Age. Proportion per 1,000 deaths in the Registration Area, 1913.

|              |       |            |      |
|--------------|-------|------------|------|
| Under 1 yr.  | 179.  | 5-9 yrs.   | 22.7 |
| 1 yr.        | 38.1  | 10-14 yrs. | 14.4 |
| 2 yrs.       | 17.2  | 15-19 yrs. | 24.4 |
| 3 yrs.       | 10.7  | 20-24 yrs. | 36.7 |
| 4 yrs.       | 7.8   |            |      |
| Under 5 yrs. | 252.7 |            |      |

---- Statistical Abstract of the United States, 1914, p. 72.

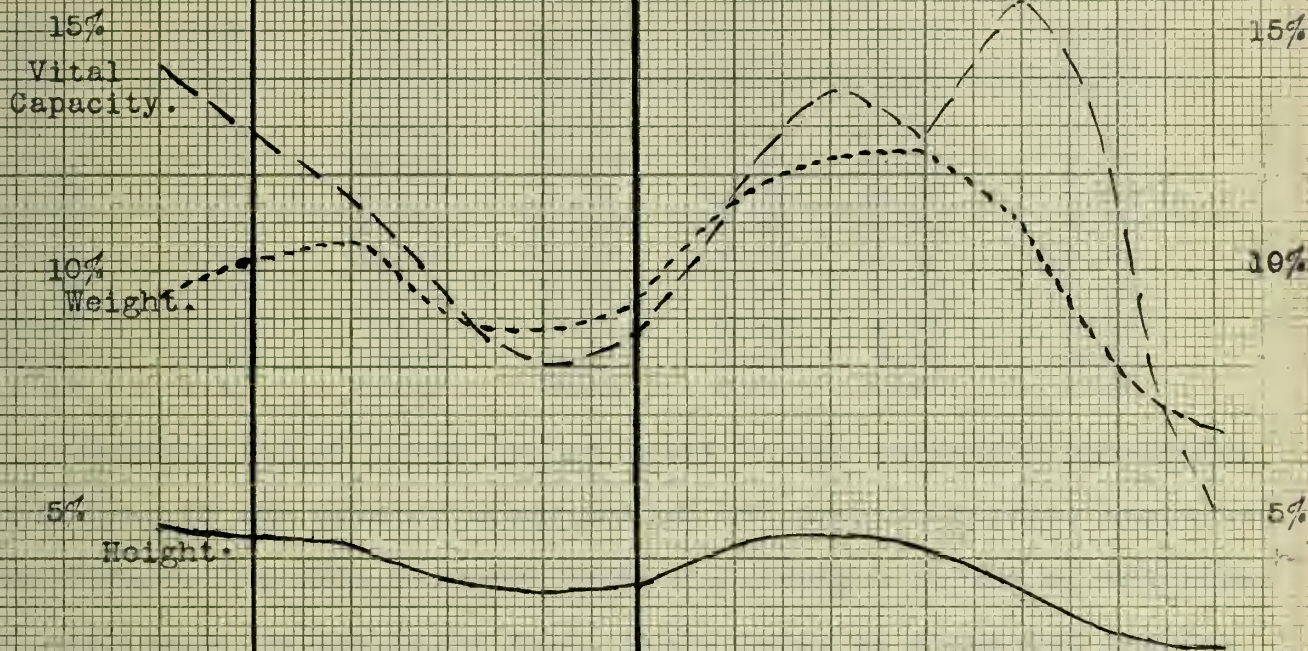
1. Tanner, A. E. The Child: His Thinking, Feeling, and Doing, pp. 25-26. Hartwell's table is originally found in Hartwell, E. M. Report of the Director of Physical Training, 1894, School Document No. 8, Boston, Mass., pp. 50-51.

2. Smedley, F. W. Op. cit., pp. 72-76.



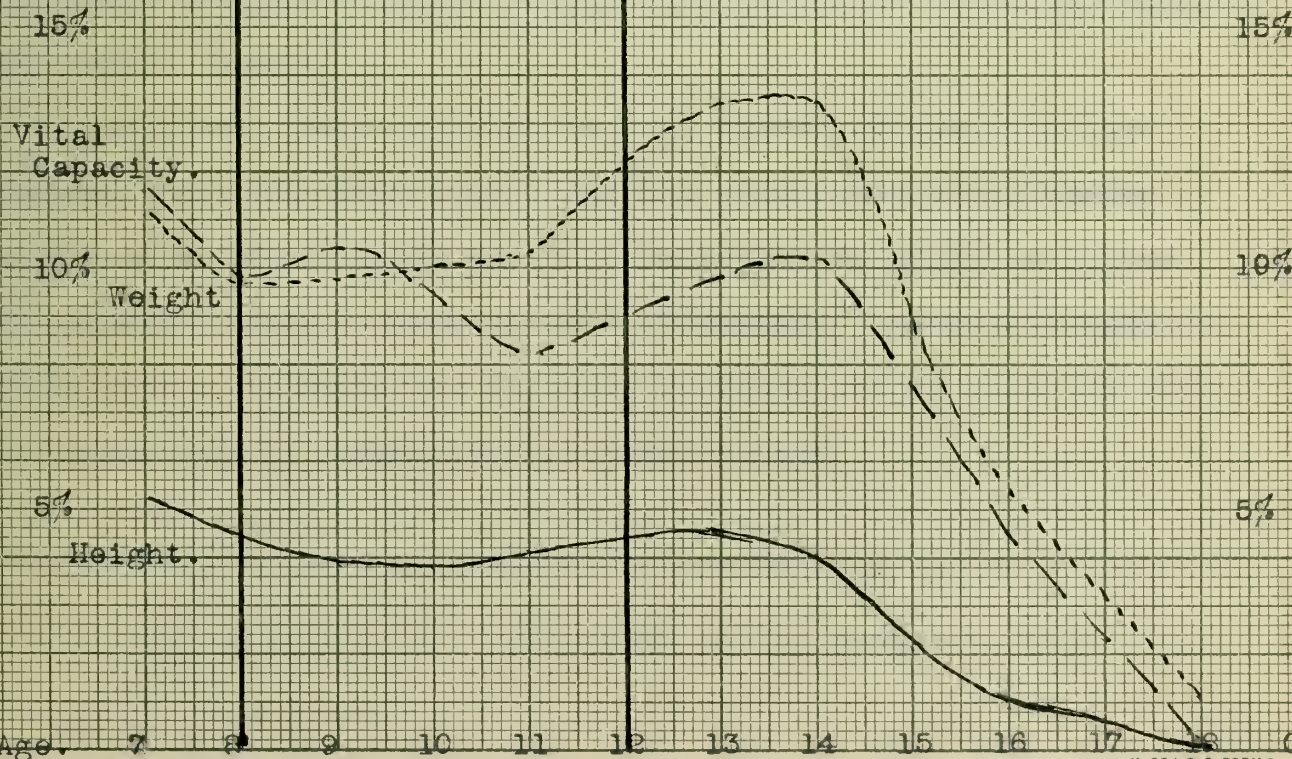
Age. 7 8 9 10 11 12 13 14 15 16 17 18 Gain %

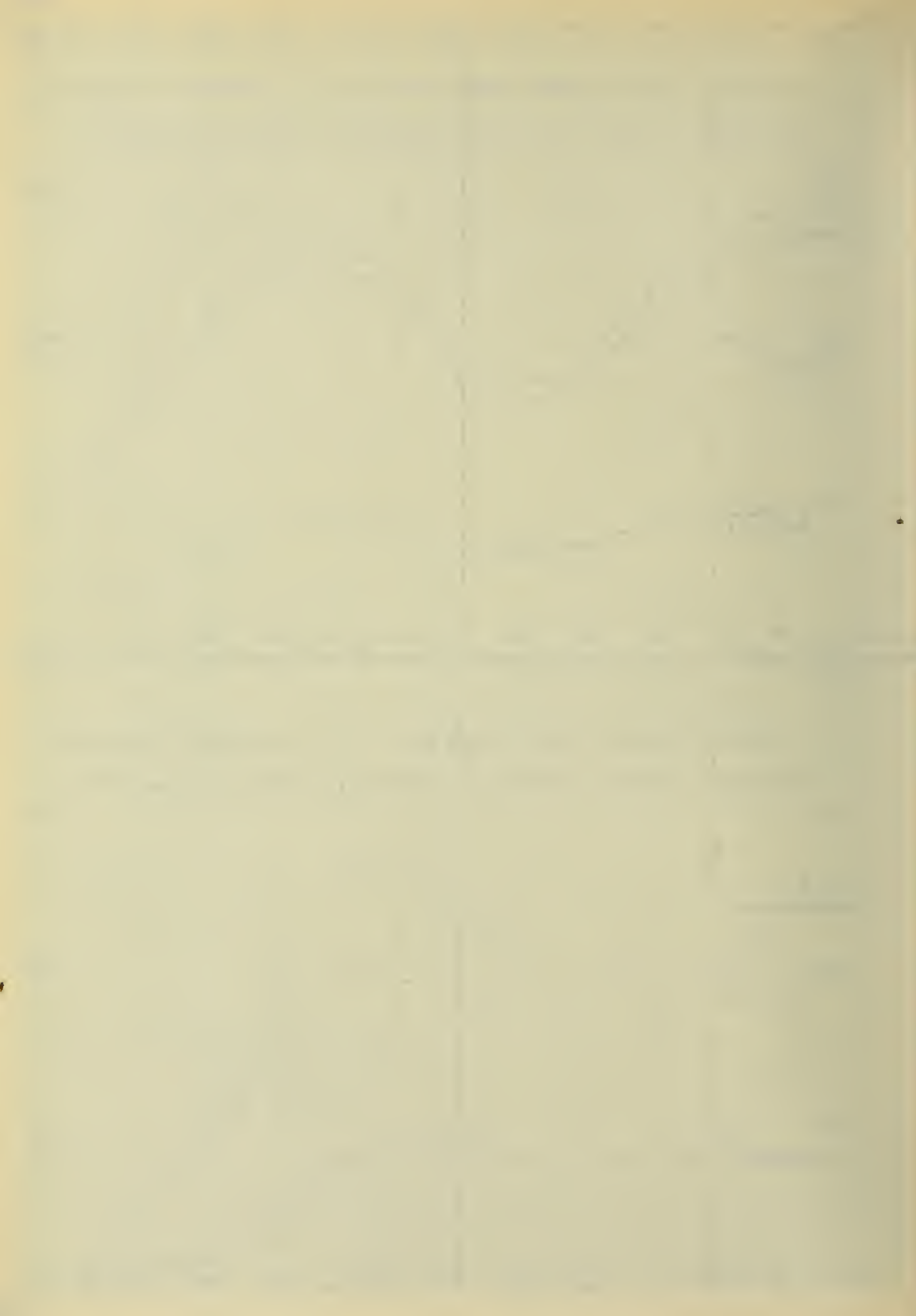
Curves showing annual rate per cent of increase for boys in height, weight, and vital capacity. Figures on page 27.



Age. 7 8 9 10 11 12 13 14 15 16 17 18 Gain %

Curves showing annual rate per cent of increase for girls in height, weight, and vital capacity. Figures on page 28.





## Annual Rate Per Cent of Increase, Girls.

| Yr. of Age. | Height. | Weight. | Ergo-graph. | R. H. Grip. | L. H. Grip. | Vital Capacity. |
|-------------|---------|---------|-------------|-------------|-------------|-----------------|
| 6-7         | 5.20    | 11.15   | 23.02       | 18.18       | 19.37       | 11.68           |
| 7-8         | 4.44    | 9.71    | 20.59       | 12.90       | 13.42       | 9.80            |
| 8-9         | 3.94    | 9.77    | 20.34       | 14.43       | 14.21       | 10.39           |
| 9-10        | 3.86    | 10.05   | 15.47       | 13.94       | 14.62       | 9.56            |
| 10-11       | 4.06    | 10.31   | 14.32       | 12.95       | 13.11       | 8.30            |
| 11-12       | 4.40    | 12.10   | 13.55       | 14.39       | 14.56       | 9.04            |
| 12-13       | 4.51    | 13.38   | 14.89       | 15.43       | 14.66       | 9.79            |
| 13-14       | 4.04    | 13.46   | 17.87       | 13.52       | 12.40       | 10.24           |
| 14-15       | 2.08    | 8.91    | 9.97        | 8.91        | 8.72        | 7.64            |
| 15-16       | 0.94    | 5.17    | 3.22        | 6.30        | 6.58        | 4.52            |
| 16-17       | 0.61    | 3.42    | 2.67        | 3.00        | 3.27        | 2.34            |
| 17-18       | 0.10    | 1.03    | 2.60        | 0.60        | 0.85        | 1.03            |

Examination of these tables leads to the important consideration that in the case of every one of the characteristics exhibited, the figures for each sex show that, following a period of relatively stationary or declining rate, there comes at about the twelfth or thirteenth year a time of rapid increase. Pubescence brings not only an increased rate of growth in size and weight, but also a more rapid increase of physical power. This adds corroboration to the statement that the intermediate period, as distinguished from the adolescent period which follows it, is one of slow, as compared with rapid, growth.

Significant data upon the rate of growth of the brain are obtained only with difficulty, and the relatively small number of cases renders the results not so trustworthy as might be wished. The standard table is that given by Donaldson<sup>1</sup>, upon the authority of Vierordt. It shows the increase in brain weight with age when the encephalon is weighed entire with the pia.

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1. Donaldson, H. H. The Growth of the Brain, p. 104.



## Weight of Brain in Grams.

| Age.      | Male.      |         | Female.    |         |
|-----------|------------|---------|------------|---------|
|           | No. cases. | Weight. | No. cases. | Weight. |
| 0 Months. | 36         | 381     | 38         | 384     |
| 1 Year.   | 17         | 945     | 11         | 872     |
| 2         | 27         | 1025    | 28         | 961     |
| 3         | 19         | 1108    | 23         | 1040    |
| 4         | 19         | 1330    | 13         | 1139    |
| 5         | 16         | 1263    | 19         | 1221    |
| 6         | 10         | 1359    | 10         | 1265    |
| 7         | 14         | 1348    | 8          | 1296    |
| 8         | 4          | 1377    | 9          | 1150    |
| 9         | 3          | 1425    | 1          | 1243    |
| 10        | 8          | 1408    | 4          | 1284    |
| 11        | 7          | 1360    | 1          | 1238    |
| 12        | 5          | 1416    | 2          | 1245    |
| 13        | 8          | 1487    | 3          | 1256    |
| 14        | 12         | 1289    | 5          | 1345    |
| 15        | 3          | 1490    | 8          | 1238    |
| 16        | 7          | 1435    | 15         | 1273    |
| 17        | 15         | 1409    | 18         | 1237    |
| 18        | 18         | 1421    | 21         | 1325    |
| 19        | 21         | 1397    | 15         | 1234    |
| 20        | 14         | 1445    | 33         | 1228    |

In spite of the irregularities of this table, due, among other causes, to an insufficient number of cases, it serves to indicate the general tendency. In his comment upon it Donaldson says: "At birth the weight of the encephalon is nearly alike in both sexes, and in both growth during the first year, and indeed during the first four years, is rapid. By the seventh year the encephalon has reached approximately its full weight, the subsequent increase being comparatively small. \* \* The fact that the brain at the seventh year of life has reached almost its full weight and the skull corresponding to it almost its full capacity, while the stature of these same individuals is but two thirds, and the body-weight only about one third of what it will be at maturity, makes it readily appreciable that it is impracticable to correlate the two processes (bodily development and growth of brain), since they take place at different periods, the increase in stature and



weight following in so large a measure the practical completion of growth in the brain."<sup>1</sup>

It seems to be the general opinion that the cessation of growth in size and weight of the brain marks the beginning of a more active development in function. "The brain grows in size," says Sully<sup>2</sup>, "and develops in structure. These two processes do not proceed with the same degree of rapidity. Size nearly attains its maximum at the end of the seventh year, whereas the degree of structural development reached at this time is not much above that of the embryonic condition. Increase of structural development means a higher degree of 'differentiation' and intricacy of arrangement." Bagley<sup>3</sup> says that "at about the age of eight, the brain practically completes its development as far as weight and size are concerned, and the changes that this organ subsequently undergoes are due to internal organization,--the knitting together of different sense areas, the ripening of the association centers, and the formation of functional connections between neurones."<sup>4</sup> Corroborative

1. Donaldson, H. H. *The Growth of the Brain*, pp. 104, 116.

2. Sully, J. *Outlines of Psychology*, p. 54.

3. Bagley, W. C. *The Educative Process*, p. 190.

4. "At about seven or eight years of age the brain has approximated its full weight, and is changing in its development from increase in size to increase in function."---Bryan, E. B. *The Basis of Practical Teaching*, p. 161.

"At eight or nine \* \* \* the brain ceases almost entirely to grow and continues to develop in complexity."--Doll, E. A. *Mental and Physical Development of Normal Children*. *Training School Bulletin*, 10:113-120 (December, 1913).

"During these years, according to the neurologists, the important phase in the development of the brain is the increase in association fibers and the further medullation of these fibers."----- Crosswell, T. R. *Amusements of Worcester School Children*. *Pedagogical Seminary*, 6:314-371 (September, 1899).



evidence has been revealed by investigations in the anatomy of the brain. Wernicke says that at about the twelfth year there is a definite increase in the medullation of the cortical association fiber-systems<sup>1</sup>, and investigations by Flechsig and others indicate that the period in the development of the brain commencing with about twelve corresponds to the particular growth of the so-called tangential fibers, connecting the different parts of the cortex. These tangential fibers are related prominently to those parts of the brain that are neither sensory nor motor. Flechsig maintains that they are association fibers, and hence he characterizes these areas of the brain as 'association areas.'<sup>2</sup>

Such an explanation of the growth and development of the brain agrees with the theory held by some that there is a compensating relationship between growth in the size of an organ and development in its function, so that a time of rapid increase in either of these processes is marked by inactivity on the part of the other. A quotation from Claparède will serve to illustrate this point of view. He says: "It is evident from the general examination of the process of functional development that at a given moment this development is affected by physical growth; it is therefore very probable that there is antagonism between the energy required for growth and mental energy. And there would be nothing surprising in such antagonism. The amount of energy which the organism has at its disposal is not unlimited, so there is nothing surprising in the fact

1. Lindley, E. H. A Study of Puzzles with Special Reference to the Psychology of Mental Adaptation. American Journal of Psychology, 8:431-493 (July, 1897).

2. Colegrove, F. W. Memory, An Inductive Study, pp. 143-145. Original source,-- Flechsig, P. Gehirn und Seele.

Also see, Gulick, L. Psychological, Pedagogical and Religious Aspect of Group Games. Pedagogical Seminary, 6:135-151 (March, 1899).



that if it is employed in supplying the needs of organic growth it must be to the detriment of cerebral function. On the other hand, whenever growth is less vigorous, the energy set free is thus applied to psychic work."<sup>1</sup>

An application of this theory to the growth of the body would explain the relatively slow and steady increase in size and weight during the period between eight and twelve as affording occasion for development of the finer muscles and the more delicate muscular and nervous coördinations. In other words, upon the cessation of physical growth the energy heretofore given up to the requirements of growth in muscular mass is free to be expended in the development of complexity, whereby there takes place the functioning and coördination of the smaller and more delicate muscles and muscular adjustments which are demanded in the more skilled movements. Evidence as to the nature, or even the existence, of this inner differentiation and coördination is, of course, rather difficult to obtain, especially since we are limited to external observation. A certain phenomenon might make its appearance with great suddenness, as far as outside appearances were concerned, and yet, for all that could thus be seen, there might have been back of the external manifestation a comparatively long period of inner development.

There is, however, some experimental evidence upon the

1. Claparède, E. Experimental Pedagogy and the Psychology of the Child. Trans. by Louch and Holman, p. 115.

Cf. Herbert Spencer, Physical Education, in Essays on Education, Etc., by Herbert Spencer, Everyman's Library Edition, p. 146. -----"It is a physiological law \* \* \* that there is an antagonism between growth and development. By growth, as used in this antithetical sense, is to be understood increase of size; by development, increase of structure. And the law is, that great activity in either of these processes involves retardation or arrest of the other. \* \* \* This law is true of each separate part of the organism, as well as of the whole."



development of voluntary motor ability. Smedley has the following table, showing dependence of rate of tapping upon age.<sup>1</sup> It will be seen that with both sexes there is a rather rapid rate of increase which is checked at twelve. The girls make no gain between eleven and twelve, and the boys none between thirteen and fourteen. Gilbert<sup>2</sup> found a drop in the tapping rate at thirteen, and the same drop occurs in Bryan's tables<sup>3</sup> though not so distinctly.

Number of Taps in Thirty Seconds (Smedley).

| Age. | Boys.    |           | Girls.   |           |
|------|----------|-----------|----------|-----------|
|      | Rt. Hand | Lt. Hand. | Rt. Hand | Lt. Hand. |
| 8    | 147      | 117       | 146      | 117       |
| 9    | 151      | 127       | 149      | 118       |
| 10   | 161      | 132       | 157      | 129       |
| 11   | 169      | 141       | 169      | 139       |
| 12   | 170      | 145       | 169      | 140       |
| 13   | 184      | 156       | 178      | 153       |
| 14   | 184      | 155       | 181      | 157       |
| 15   | 191      | 169       | 181      | 159       |
| 16   | 196      | 170       | 188      | 167       |
| 17   | 196      | 174       | 184      | 162       |
| 18   | 197      | 183       | 193      | 169       |

Studies by Bryan, Gilbert, and Burk<sup>4</sup> indicate that the period from six to ten is one in which the hand rapidly gains power in rapidity of movement, strength and precision. The period of

1. Whipple, G. M. Manual of Mental and Physical Tests. Part I, Simpler Processes, p. 139.

2. Gilbert, J. A. Researches on the Mental and Physical Development of School Children. Studies from the Yale Psychological Laboratory, 2:40-100 (November, 1894). Gilbert says that his curves throughout this series of experiments rather seem to justify the opinion that physical development takes up the strength and thus retards mental development.

3. Bryan, W. L. On the Development of Voluntary Motor Ability. American Journal of Psychology, 5:125-204 (November, 1892).

4. Burk, F. From Fundamental to Accessory in the Development of the Nervous System and of Movements. Pedagogical Seminary, 6:5-64 (October, 1898).



nascency for the fingers does not seem to have been reached till after ten, and probably does not reach its culmination until after adolescence; and the degree of voluntary control necessary for accuracy of hand and arm is not reached until the ninth or tenth year. In his investigation of the value of movement exercises in writing, Freeman<sup>1</sup> found that children of the first three or four school grades did not profit much by such exercises. Between the fourth and fifth or sixth grade, however, there was a sudden transition, where movement drill began to have marked results in the child's writing. This was not due to the culmination of the experience of the previous four or five years, for the children who were the subjects of the investigation had not in any case had the movement drill for more than one year.

These different investigations present trustworthy evidence that the slow rate of growth which has been shown to take place during the intermediate period affords opportunity for the development of the finer movements. There is another consideration of importance in the fact that the tapping rate falls off at the time of adolescent growth, which seems to indicate that increased growth in mass offers an obstacle to development of motor ability. Applying the converse of this argument, we should expect motor ability to show development during the period of slow growth, and experimental evidence shows that it actually does so.

A very ingenious and suggestive theory developed by Hughlings Jackson, largely on the basis of his clinical observations, is that the nervous system may be regarded as made up on three "levels." The lower level is the reflex level, made up of the spinal cord

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1. Freeman, F. N. Some Issues in the Teaching of Hand-writing. *Elementary School Teacher*, 12:1-7 (September, 1911).



and the nuclei of origin of the cranial nerves. The second, or middle level, comprises the basal ganglia and the sensory-motor area of the cortex. The highest level is represented by the remainder of the cortex and has to do with the higher mental operations.<sup>1</sup> These three levels develop one after another in this order, and the chief years for the development of the second level are those between seven and twelve. It is during the intermediate stage, then, that on the basis of this theory the finer sensory and motor developments take place.

Not until the child has arrived in the middle grades, therefore, is it possible to exact from him any great degree of accuracy in such school work as penmanship, drawing, or handwork. But drill in such work finds its proper place in these grades, and this is a time peculiarly fitted for the learning and establishment of skillful and accurate movements.<sup>2</sup>

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1. Colegrove, F. W. *Memory, An Inductive Study*, p. 146. Also see, Barker, *The Nervous System*, p. 993.

2. Partridge, G. E. *Genetic Philosophy of Education*, p. 127.



CHAPTER III.  
PSYCHOLOGICAL CHARACTERISTICS,  
BASED ON EXPERIMENTAL INVESTIGATION.

Experimentation and investigation directed toward mental characteristics have to contend with difficulties of the most complex and troublesome nature. Not only are reliable data difficult to obtain, because of the peculiar nature of the matter of investigation, the difficulties inherent in the development and application of method, and the extreme consideration that must be given to the question of the disturbing factors which are almost bound to creep in; but even when once obtained they present manifold problems as to their proper evaluation and interpretation. This chapter will be taken up with a discussion of such of the more scientific and trustworthy studies as seem to throw light upon the distinctive psychological characteristics of the child from eight to twelve years of age and the chief features of his mental development during that time. It is, of course, impossible to draw a sharply defined line of separation between physiology and psychology, and the phenomena first to be described in this chapter may serve to connect it with the preceding one, for, having to do with what is known as "sensory capacity," they belong in that strip of overlapping area which is the common property of both these sciences.

Gilbert<sup>1</sup> studied the development of the ability to discriminate differences of lifted weights, or sensitiveness to weight

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1. Gilbert, J. A. Researches on the Mental and Physical Development of School Children. Studies from the Yale Psychological Laboratory, 2:40-100 (November, 1894). Whipple points out the fact that Gilbert's method is open to criticism. See Whipple, G. M. Manual of Mental and Physical Tests, Part I, p. 224.



difference. He found a gradual increase in this ability from six to thirteen. The boys showed a falling off between ten and eleven and the girls made no gain between eleven and twelve. The table shows the median limen (least perceptible difference of weight) in grams for each age.<sup>1</sup>

| Age.   | 6    | 7    | 8    | 9    | 10  | 11   | 12  | 13  | 14  | 15  | 16  | 17  |
|--------|------|------|------|------|-----|------|-----|-----|-----|-----|-----|-----|
| Boys.  | 13.0 | 13.2 | 12.2 | 10.2 | 8.6 | 10.2 | 7.6 | 6.0 | 5.0 | 6.2 | 6.0 | 6.0 |
| Girls. | 16.8 | 13.2 | 11.0 | 10.0 | 9.2 | 7.6  | 7.6 | 5.6 | 7.2 | 7.2 | 6.8 | 6.4 |

In other investigations Gilbert found that reaction time for both boys and girls seemed to increase less rapidly from eight to nine than at the other ages. Ability of color discrimination showed a rapid increase until the age of ten for both sexes. The years of nine to eleven for the boys and ten to twelve for the girls were periods of small increase in this ability. In an attempt to determine capacity for pitch discrimination as affected by age he obtained the results shown by the following table.<sup>2</sup>

Least Perceptible Difference in Pitch  
in 32nds of a Tone.

| Age.        | 6    | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  |
|-------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Difference. | 12.3 | 9.1 | 6.8 | 4.8 | 6.2 | 4.8 | 4.1 | 3.7 | 3.5 | 5.0 | 4.0 |

This table shows rapid development in the ability to discriminate pitch of a musical tone up to the age of ten. In the three years from six to nine there is more of a gain than can possibly be made during the rest of the lifetime, a confirmation of the general pedagogical principle that the first ten years of a child's life

1. This table is given in Whipple, G. M. Manual of Mental and Physical Tests, Part I, p. 227.

2. Gilbert, J. A. Experiments on the Musical Sensitiveness of School Children. Studies from the Yale Psychological Laboratory, 1:80-87 (October, 1893). The table as here given is found in Rusk, R. R. Introduction to Experimental Education, p. 60.



are years of more rapid development than takes place at any other time. A possible explanation for the abrupt loss of ability which the table shows to occur at ten may be that it is due to disturbances occasioned by the second dentition, which may have such an influence on mental development as to cause loss of sensitiveness in this particular. Gilbert's results in general show that from about ten to twelve there is a general loss of ability in the various types of sense-discrimination, to which the same explanation might apply.

It has been said that imagination is the intellectual activity that may be best used and trained during this period.<sup>1</sup> Allen made a study of children's preferences for stories and found a sharp decline in liking for myths and fairy tales between the third and the fourth grade, as shown in the accompanying table.<sup>2</sup>

| Grade. | Per cent Preferring<br>Fairy Tales and Myth. |
|--------|----------------------------------------------|
| 3      | 82                                           |
| 4      | 38                                           |
| 5      | 42                                           |
| 6      | 36                                           |
| 7      | 11                                           |
| 8      | 15                                           |

A glance at this table will show that after this loss of interest at the end of the third grade, there is practically no more loss until the end of the sixth grade, when another sharp drop occurs. Colvin<sup>3</sup> calls attention to these results as showing the direction in which imagination tends to develop. He says that "other obser-

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1. Kirkpatrick, E. A. *The Individual in the Making*, p. 293.

2. Allen, E. *The Pedagogy of Myth in the Grades*. *Pedagogical Seminary*, 8:258-277 (June, 1901).

3. Colvin, S. S. *The Child's World of Imagination*. *Elementary School Teacher*, 6:327-342 (March, 1906).



vations and studies seem to indicate that there is a gradual lessening of this type of imagination, and a development in the direction of interest in heroes and great deeds of courage and daring, while still later there is an accentuation of imagination along more practical and less fanciful lines."

Colvin had one of his students make a study of some 3,000 compositions, written by pupils of the four upper grades of the elementary school and the four years of the high school. These were carefully examined and a record was made of the visual, auditory, tactile, pain, olfactory, gustatory, organic, and muscular images among the more simple forms of imagination, while the more complex types, represented by the productive imagination, were studied under the heads of scientific, fairy story, nature myth, heroic, dramatic, religious, and melancholic. The curves for auditory, tactile, and pain images showed a marked decline at about the onset of puberty, while the curve of the visual type for both boys and girls steadily rose throughout the eight years studied. The same tendency to fall at puberty was noted in the gustatory, organic, and muscular curves. The olfactory did not show it, but this particular curve ran so low through all of these years that it might as well have been ignored. Nor were the more complex types exceptions to the observed rule. The fairy story, nature myth, heroic, dramatic, and religious types of imagination showed a fall at this period; while the scientific type, especially in the case of the boys, and the melancholic, which made scarcely any showing at all before adolescence, showed a rise. Out of the fifteen types enumerated, therefore, all but four showed a decline at the beginning of adolescence, and of these four, one was so slight for all of the grades as to be of but little importance.



Kirkpatrick tested the imagination of children of the eight elementary grades by showing them four ink spots and asking them to name them, a time of about one minute being allowed. In this test the younger children seemed more imaginative, as they named more of the spots. The number who saw the spots as objects was less in grades four, five, and six, increasing in grades seven and eight, but not equaling those of the first. The table here given shows the average number of "names" given to the spots.

|          |     |     |     |     |     |     |     |     |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|
| Grade.   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   |
| Average. | 2.9 | 2.5 | 2.6 | 1.8 | 1.9 | 1.7 | 2.1 | 2.2 |

In discussing these results, Kirkpatrick says: "The younger children seemed to have no doubt whatever of the spot being a picture of the object they named, while the older children simply said 'it is some like' or 'it looks a little like,' 'a dog,' 'cloud,' or whatever else was suggested. This superiority of the small children is striking when we consider that the number of mental images that they have is much smaller than that possessed by older children, who may name a part of the body or a map of a country or something else that the younger children know nothing about.

The smaller number of objects seen in the spots by the children of the fourth, fifth, and sixth grades is probably to be explained by the fact that children of those ages have become more critical in their sense-perception, as their ideas have become more definite, and as they have learned from life's experiences and from training to be more careful in their judgments. The older pupils of the seventh and eighth grades, on the other hand, have passed into another stage in which they realize that a picture is not necessarily this or that, but may resemble any one of several things, hence they are not afraid to say what it looks like."<sup>1</sup>



It is evident, therefore, that, as Whipple points out, the preceding table exhibits something besides a simple decline of "imagination" with age.<sup>2</sup> A table of norms for a varied method of this test is published by Pyle and shows a tendency similar to that shown by Kirkpatrick's table.<sup>3</sup>

Small made a series of experiments upon the suggestibility of children, endeavoring to see how far illusions of smell and sight could be produced in ordinary children under school-room conditions. He placed rows of labeled perfume bottles in full view of the children, telling them that a spray of perfume was to be made in the room, and that as soon as anyone could smell perfume after the spraying he was to indicate it at once. A spray of unscented water was then made and the following results were obtained.<sup>4</sup>

| Grade.                                | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  |
|---------------------------------------|----|----|----|----|----|----|----|----|
| Per cent receiving strong suggestion. | 98 | 95 | 83 | 63 | 50 | 27 | 13 | 0  |
| Per cent receiving weak suggestion.   |    |    |    | 13 | 20 | 9  |    |    |
| Per cent not sure.                    |    |    |    |    |    | 14 |    | 67 |
| Per cent receiving no suggestion.     | 2  | 5  | 17 | 24 | 30 | 50 | 87 | 33 |

His illusion of sight was a contrivance by means of which a suggestion of motion was given, although there was no movement.

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1. Kirkpatrick, E. A. Individual Tests of School Children. Psychological Review, 7:274-280 (May, 1900).

2. Whipple, G. M. Manual of Mental and Physical Tests, Part II, Complex Processes, p. 258.

3. Pyle, W. H. The Examination of School Children, pp. 34-35.

4. Small, M. H. The Suggestibility of Children. Pedagogical Seminary, 4:176-220 (December, 1896).



The per cent of children who reported that they saw motion was:<sup>1</sup>

|           |    |    |    |    |   |    |    |
|-----------|----|----|----|----|---|----|----|
| Grade.    | 1  | 2  | 3  | 4  | 5 | 6  | 7  |
| Per cent. | 96 | 81 | 80 | 70 | * | 34 | 71 |

These results show a rather rapid and steady decline in suggestibility with age and in that respect are not in complete agreement with some other tests which were carried out in a somewhat more scientific manner. Guidi arranged an apparatus so as to give an illusion of warmth and obtained from his experiment the following results.<sup>2</sup>

|                       |     |      |      |      |     |     |      |      |      |
|-----------------------|-----|------|------|------|-----|-----|------|------|------|
| Age.                  | 6   | 7    | 8    | 9    | 10  | 11  | 12   | 13   | 14   |
| Per cent suggestible. | 50. | 40.9 | 51.8 | 62.5 | 50. | 40. | 33.3 | 21.4 | 27.3 |

Guidi's results show the force of suggestibility to be greatest at nine.<sup>3</sup> The same age was found to be the time of greatest susceptibility in an experiment by Gilbert, which, however, strictly speaking is not a test of suggestibility in the same sense that Guidi's was. Gilbert tested children by the size-weight illusion. He made use of twenty blocks of similar size but of different

1. The test was not given in the fifth grade. In the sixth it was given under conditions so much more favorable than in the other grades that the figures for this particular grade are not comparable with those from the others.

2. This table is given in Whipple, G. M. Manual of Mental and Physical Tests, Part II, p. 252. The original reference is Guidi, G. Recherches expérimentales sur la suggestibilité. Archives de Psychologie, 8:49-53 (1908).

3. "Eight to ten is generally recognized as a period of great susceptibility to suggestion and imitation."---King, I. The Psychology of Child Development, p. 197.

"Suggestibility rises from the second to the fourth grade and then falls rapidly."---Terman, L. M. A Preliminary Study in the Psychology and Pedagogy of Leadership. Pedagogical Seminary, 11:413-451 (December, 1904).



weights (ranging from five to one hundred grams), asking the subject to pick out one which was of equal weight to one of two standard blocks which were of marked difference in size but of equal weight (55 grams). The illusion in this test lies in the circumstance that the large block feels the lighter. His complete results are shown by the table.<sup>1</sup>

Force of Suggestion in Grams, Median Values.

| Age.   | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   |
|--------|------|------|------|------|------|------|------|------|------|------|
| Boys.  | 43.5 | 43.5 | 45.0 | 50.0 | 40.0 | 38.5 | 38.0 | 37.0 | 31.0 | 33.0 |
| Girls. | 42.0 | 43.5 | 49.5 | 49.5 | 44.0 | 40.0 | 41.0 | 38.0 | 33.5 | 38.0 |

Gilbert says that the reason the child grows worse from six to nine is because at six he has not yet learned to compare and "as he learns gradually to judge a thing from more aspects than one, or in other words, learns to interpret one sense by another, the force of suggestion given by the eye to the muscle increases until at nine he has come to the age of experience enough to see that things are not always what they seem. Consequently at this age he begins to correct misleading influences bearing upon him." "Very young children," says Thorndike<sup>2</sup>, "are not so amenable to suggestion as those eight or nine years of age, because they are often unable or only partly able to get the idea or understand the command. For a suggestion to work to the best advantage, the subject must comprehend the idea perfectly and still have absolutely no inhibiting ideas. So, as children grow from a year or so to sixteen or eighteen, they become better subjects by virtue of their increased comprehension, and worse subjects by virtue of the growth

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1. Gilbert, J. A. Researches on the Mental and Physical Development of School Children. Studies from the Yale Psychological Laboratory, 2:40-100 (November, 1894).

2. Thorndike, E. L. Notes on Child Study, pp. 116-117.



of a system of criticising ideas. Speaking roughly, the first tendency is the stronger up to nine years, and after nine years the second. Consequently about nine years is the most suggestible age."

Regarding the nature of ideational types, Colvin and Myers<sup>1</sup> found a preponderance of the visual type in the lower grades, and a gradual falling off through the higher ones. They give the following table.

| Grade.   | 3  | 4  | 5  | 6  | 7  | 8  |
|----------|----|----|----|----|----|----|
| Visual   | 58 | 51 | 45 | 24 | 26 | 23 |
| Auditory | 11 | 11 | 40 | 36 | 34 | 32 |
| Motor    | 11 | 18 | 5  | 19 | 21 | 21 |
| Balanced | 20 | 20 | 10 | 21 | 19 | 24 |

These figures are in per cents, each individual being classed in only one group according as to which type predominated in his work. Concrete visual imagery was found to be remarkably strong in the earlier years. The table below shows the average of correct results for each grade in tests on imagery of this type.

| Grade.    | 3   | 4   | 5   | 6   | 7   | 8   |
|-----------|-----|-----|-----|-----|-----|-----|
| Per cent. | 75. | 74. | 72. | 72. | 65. | 82. |

Concrete visual imagery is strong in the lower grades and suffers a decline during the school years. Verbal visual imagery shows a tendency to rise as the concrete type falls. In the lower grades, ideational types are more distinctly marked than in the upper ones, showing more variety and a wider range of individual differences. From the fourth grade to the eighth there is a growing tendency toward what might be called the balanced type, in which the three types (visual, auditory, and motor) are more on a level. Young children think largely in concrete visual images. While

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1. Colvin, S. S., and Myers, E. J. The Development of Imagination in School Children. Psychological Review Psychological Monographs, 11:85-126 (November, 1909).



auditory and motor imagery are present to some degree, they play a relatively unimportant rôle in the lower grades. The child, up to ten at least, is predominantly a visualizer. Concrete visual and probably all concrete imagery tends to fall off in the more advanced grades and its place is taken by verbal imagery.<sup>1</sup>

Turning to the question of the nature and development of memory during this period, we find that there is a prevalent belief that the years of the middle grades form the memory period par excellence. The general supposition is that at this time of life memory reaches a height of readiness and excellence from which it afterward declines and never regains. It is held that the intermediate grades afford the best time for the learning of a language; that the mechanical memory of children, with perhaps the exception of the very young, is superior to that of adults; that their memories are much more plastic; that the capacity for memorizing falls off somewhere in the early teens;--in short, that the memory of childhood is superior to that of any other period of life, and that in the middle grades we have what is preëminently the learning period. Bagley puts it in this way: "The capacity for retaining concrete sense impressions is never so strong as during this period; the mind seems to grasp and hold everything that reaches the focus of the attention. Even words that are comparatively empty of meaning can be readily impressed; as President Hall says: 'Verbal memory is at its very best and should be trained far more than it is.' In short, in no other stage of childhood is it so thoroughly true that the mind is 'wax to receive and marble to retain.'"<sup>2</sup> Kirkpatrick somewhat

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1. Colvin, S. S. The Learning Process, p. 114.

2. Bagley, W. C. The Educative Process, p. 193. For the original place of quotation from Hall see Hall, G. S. The Ideal School as Based on Child Study. N. E. A. Proceedings, 1901, pp. 474-488, especially p. 478.



cautiously states that it is probable that a child's memory for words reaches its climax before he enters the teens, and that he probably never has more capacity for remembering what he has vividly imagined than he has at this time.<sup>1</sup>

The experimental evidence, however, goes to show that the theory that the intermediate period is preëminently a memory period is not correct, or, at best, is correct only under very strict limitations of interpretation. A great many studies have been made, the results of which show that there is no "climax" of memory power anywhere within the school years. The capacity for learning increases with age up to the period of maturity, and then remains constant until the beginning of old age.<sup>2</sup>

Pohlmann, using various kinds of material and varied forms of presentation with careful methods, obtained the following net efficiencies at the different ages included in his study.<sup>3</sup>

| Age.              | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   |
|-------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Average capacity. | 39.4 | 41.4 | 55.7 | 59.1 | 62.1 | 68.9 | 55.3 | 62.9 | 58.6 | 58.0 | 65.4 | 68.3 |

These figures show a rather rapid gain in efficiency up to

1. Kirkpatrick, E. A. The Individual in the Making, pp. 192-3.

"Verbal memory is at its best in the preadolescent period."--- Bagley, W. C. English in the Intermediate Grades. Montana State Normal College Bulletin, Vol. 6, No. 4 (April, 1905).

"During this period the verbal memory is good, reaching maximum power at about its end, while children are particularly interested in names."--- Ellis, A. C. Suggestions for a Philosophy of Education. Pedagogical Seminary, 5:159-201 (October, 1897).

"Memory is growing stronger, the maximum memory power being reached at about the close of the period."--- Pease, G. W. An Outline of a Bible-School Curriculum, p. 150.

2. Pillsbury, W. B. Essentials of Psychology, p. 191.

3. Whipple, G. M. Manual of Physical and Mental Tests, Part II, pp. 175-8. Original Source, Pohlman, A. Experimentelle Beiträge zur Lehre vom Gedächtniss.



fourteen, the gain being especially large between ten and eleven or twelve. Between fourteen and fifteen there is a marked drop, perhaps due to adolescent disturbances, which is followed by a period of fluctuation. By twenty, however, practically all the loss has been made up.

Smedley, upon the basis of evidence produced by his investigations upon Chicago school children, maintains that auditory memory for digits is stronger than visual memory up to the age of nine, when these conditions are reversed and the visual memory of most children becomes stronger than the auditory and continues to develop more rapidly than the auditory throughout the rest of the school life. Auditory memory develops rapidly up to about fourteen years of age, and only slowly after that. The period of rapid development of visual memory extends a year or two longer. Smedley expressly states that his investigation reveals no "memory period;" no period in early school life when the memory is stronger than it is at any later portion of the child's life, a period especially adapted to memorizing."<sup>1</sup>

Pyle gives the following table of norms of performance in verbal memory for various ages. Two lists of nouns were used, the one concrete, the other abstract. The figures given represent the normal score for each age. A perfect score would be 66 points for each list.<sup>2</sup>

#### Boys.

| Age. | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | Adults. |
|------|------|------|------|------|------|------|------|------|------|------|------|---------|
| Con. | 31.2 | 32.4 | 35.8 | 37.7 | 37.7 | 38.3 | 40.0 | 40.2 | 43.4 | 45.7 | 49.0 | 44.3    |
| Abs. | 22.9 | 26.3 | 26.8 | 31.7 | 31.0 | 32.4 | 37.3 | 34.1 | 40.0 | 41.1 | 40.8 | 42.3    |

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1. Report of the U. S. Commissioner of Education, 1902, Vol. I, pp. 1132-1133.

2. Pyle, W. H. The Examination of School Children, p. 16.



## Girls.

| Age. | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | Adult. |
|------|------|------|------|------|------|------|------|------|------|------|------|--------|
| Con. | 32.9 | 32.7 | 39.6 | 37.7 | 38.7 | 40.4 | 44.2 | 42.0 | 42.5 | 40.5 | 52.0 | 47.6   |
| Abs. | 20.5 | 24.0 | 31.0 | 31.8 | 34.0 | 36.0 | 39.0 | 37.8 | 41.0 | 37.0 | 49.0 | 39.8   |

These figures show no special memory period. There is a general rise from one end of the table to the other, the age 18 showing the best scores. The adult scores are practically as good as those at 18, though a trifle lower. It is an interesting fact that at eleven boys and girls are on an equality in both types of memory. Pyle's results show that concrete words are reproduced better at every age, but according to Meumann fourteen and fifteen year old children often do better with the abstract lists.<sup>1</sup>

For logical memory, or memory of ideas, Pyle's results are:<sup>2</sup>

| Age.   | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | Adult. |
|--------|------|------|------|------|------|------|------|------|------|------|------|--------|
| Boys.  | 24.3 | 28.7 | 30.0 | 32.9 | 35.1 | 36.8 | 36.1 | 36.5 | 34.4 | 34.6 | 36.9 | 38.3   |
| Girls. | 28.5 | 31.0 | 33.5 | 36.4 | 38.1 | 38.5 | 39.0 | 39.1 | 37.3 | 36.6 | 37.8 | 40.1   |

These figures represent number of ideas correctly reproduced from a story containing 67 ideas in all. Boys reach a high point at thirteen, after which there is a fall, but at eighteen they have regained the lost ground. Girls stand higher at fifteen than at any other age before nineteen. For both sexes adults have better scores than any of the other age-groups represented.

Lobsien investigated the dependence of different types of memory upon age, testing 426 children ranging in age from eight to fourteen. According to his results, the greatest relative increase of immediate memory occurs between the tenth and twelfth years. Special memories develop at different rates with children and differ with boys and girls. Young children from nine to fourteen years of age possess a strikingly feeble memory for emotions, and this

1. Whipple, G. M. Manual of Mental and Physical Tests, Part II, p. 188.

2. Pyle, W. H. The Examination of School Children, p. 10.



weakness lasts till the puberty stage. The special memories may be arranged in the following order of development: with boys, the memory for objects is first developed, then words of visual content, words of auditory content, sounds, terms denoting tactual and motor experiences, numbers, abstract conceptions, and, lastly, emotional terms; with girls, the order is words of visual content, objects, sounds, numbers, abstract conceptions, words of auditory content, terms denoting tactual and motor experiences, and emotional terms.<sup>1</sup>

Binet and Henri dictated seven words to their subjects and found that children from eight to nine retained an average of 4.6 words; from ten to eleven, 4.9 words; from eleven to twelve, 4.8; and from twelve to thirteen, 4.9.<sup>2</sup> Bolton dictated digits at intervals of two fifths of a second, requiring the children to write them as they remembered them. The table gives the percentage of errors for each age.<sup>3</sup>

| No. of<br>digits. | Age. |      |      |      |      |      |      |      |
|-------------------|------|------|------|------|------|------|------|------|
|                   | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   |
| 5                 | 20.0 | 14.5 | 12.0 | 9.3  | 7.4  | 6.6  | 4.6  |      |
| 6                 | 56.3 | 45.5 | 42.5 | 32.4 | 31.3 | 27.7 | 23.5 | 25.3 |
| 7                 | 78.0 | 64.6 | 66.2 | 62.5 | 51.5 | 49.2 | 36.1 | 40.7 |
| 8                 |      |      |      | 84.0 | 73.7 | 70.5 | 65.5 | 66.2 |

Binet and Henri's results show no particular gain between eight and thirteen. Bolton's table does not extend upward in age far enough to show whether the slight drop in efficiency at fifteen

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1. Rusk, R. R. Introduction to Experimental Education, pp. 80-83. See also Whipple, G. M. Manual of Mental and Physical Tests, Part II, p. 178. The original source is Lobsien, M. Experimentelle Untersuchungen über die Gedächtnissentwicklung bei Schulkindern. Zeitschrift für Psychologie, 27:34-76 (1901).

2. Meumann, E. The Psychology of Learning. Trans. by J. W. Baird, p. 321. Original source, Binet, A, and Henri, V. La Mémoire des Mots. L'Année Psychologique, 1:1-23 (1894).

3. Bolton, T. L. The Growth of Memory in School Children. American Journal of Psychology, 4:362-380 (1892).



is ever made up. In general, however, his results show a gradual improvement with age throughout the period from eight to fourteen.

Wessely attempted to test retention, wishing to determine whether material which had been learned in the school was still held in memory after long intervals of time. He asked pupils from ten to fifteen years of age to write from memory a poem which they had learned about a year before, and from the data thus collected was able to discover the amount remembered. In a second test, boys of nine to fifteen years of age were asked to learn lists containing eight Latin words with their German equivalents. The retentive effect of learning was tested immediately afterward, and also after intervals of one day, eight days, and four weeks, by presenting the German words in a changed order, and having the pupils recall the corresponding Latin word. He concluded from his investigations that in the first type of experiment retentive capacity increases up to twelve years of age, in the Latin vocabulary test up to eleven years, inclusive; and from then on retention and certainty of reproduction decrease.<sup>1</sup>

The results of this experiment, though seeming to indicate the presence of a special memory period just before adolescence, cannot be cited as conclusive evidence in support of such a belief. The findings here described might be explained as being due to the existence during these years of conditions causing a more complete reliance upon the purely retentive factor of memory than necessary at the other ages coming under the limits of the investigation. Retention depends largely upon repetition and relearning. These

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1. Meumann, E. The Psychology of Learning. Trans. by J. W. Baird, p. 257. Original Source, Wessely, R. Zur Frage des Auswendiglernens. Neue Jahrbücher für Pädagogik, 8:297-309, 373-386 (1905).



years of seemingly increased power of retention might, therefore, even be considered as years of decreased learning capacity and, in that sense, of less efficient memory, on the ground that they were years when more repetition was required for the mastery of the subject matter, or at least when, because of a real or felt need, reliance was placed mainly or alone upon the purely retentive side of memory.

By far the greater amount of the experimental evidence goes to show that capacity for learning and for immediate reproduction, at least, increases with age up to the attainment of maturity and then persists unchanged until the approach of senile degeneration. Learning is most easy and remembering is most complete when maturity has been reached.<sup>1</sup> This development with age is shown by practically all the investigations, in spite of the fact that many different methods of testing have been used. Even the belief that in childhood is the best time to learn a foreign language and that mature students are less capable of doing the necessary memory work for the acquisition of a language is very probably fallacious.<sup>2</sup> One is forced to the conclusion that the popular notion that children learn better than adults has no basis in fact. The child's close observation of routine events, and the frequency of recollection of those events of childhood that persist because of their original interest, are things which among others are perhaps responsible for the wide prevalence of such a belief.<sup>3</sup>

In memorizing, the adult makes use of the two factors of

1. Pillsbury, W. B. Attention, p. 140.

2. Colvin, S. S. The Learning Process, p. 136. Also, Parker, S. C. Methods of Teaching in High Schools, pp. 318-319.

3. Pillsbury, W. B. Essentials of Psychology, p. 191.



impression and association, especially the latter. Children do not make much use of the factor of association,--from the nature of things they cannot,--but depend largely upon the factor of impression. They therefore exhibit the "retentive" type of memory, not so much because of any greater absolute power of mere retentivity, but because of its greater relative value, which depends upon the fact of their small use of association. It cannot be demonstrated that mere retentivity, even, is absolutely greater among children than among more advanced pupils.<sup>1</sup>

This relatively greater value of retentivity, or the factor of impression, justifies the pedagogical practice of making a drill period of the middle grades. Mere impression is more important in mechanical than in meaningful learning, and retention depends upon repetition, therefore the method of the middle grades must of necessity be largely mechanical and repetitious in its nature, in other words, must partake of the nature of drill. The fact that there is some evidence of disturbances in memory at about the time of pubescence would also indicate the necessity of memory work before that time, and make of the grades a place where a rather large amount of such work has to be taken care of. Aside from any consideration as to the psychology of the child, certain things are so fundamental that they must be drilled upon until they become automatic, and their preparatory value is so great that they cannot be long deferred in the school course. Children in the primary grades have not yet acquired control of attention sufficient to make feasible the amount of drill which is necessary to establish these fundamental powers, and upper-grade children would hardly submit to laborious drill even if it were possible to defer the acquisition

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1. Colvin, S. S. The Learning Process, p. 173.



of these fundamentals until that period of the course. For all these considerations, the middle grades must continue to be the place where most of the emphasis is put upon drill and habituation.

In connection with the relatively poor development of the capacity of immediate retention at this stage, Meumann points out the very important pedagogical consideration that this capacity must constantly be made use of by the child in his work at school. This is the psychological basis for the often cited rule that questions should be short. In almost all the work of the middle grades, immediate retention has a leading part, a circumstance which the careful teacher should never overlook and of whose consequences she should be well aware.<sup>1</sup>

That type of attention known as "passive"--the response to the "strong stimulus"--is still the dominant type in this period. But at this stage it becomes necessary that the child learn better to control his attention and to make more use of the "active" type. This requirement can now be placed upon him with much less fear of untoward results than could have been the case in the primary grades, in other words, sustained drill now becomes possible. The child's interests, however, are still objective, for the differences between the nature of the attention in this period and in the preceding one are not of kind but of degree.<sup>2</sup>

Mrs. Squire<sup>3</sup> found a development in degree of attention corresponding to increase of age. It is highly significant for our purposes that in this development she found two decided breaks, or

1. Meumann, E. *The Psychology of Learning*. Trans. by J. W. Baird, p. 326.

2. Bagley, W. C. *The Educative Process*, p. 192.

3. Squire, Carrie R. *Graded Mental Tests*. *Journal of Educational Psychology*, 3:363-380 (September, 1912).



periods of more rapid improvement, at times which correspond very closely to the customary points of division of the elementary school course. The first of these breaks was found to occur between the seventh and eighth years of age, marking the transition between the fluctuating attention of the primary grades (or sixth and seventh years) and the somewhat more sustained attention of the four years belonging to the intermediate period. The second, coming between eleven and twelve, marks the change from the intermediate period to that of the grammar grades (or twelfth and thirteenth years), where the attention is under still better control.

This development of the power of active attention is the basis of the pedagogical change of attitude toward the "interests" of the child as he advances through the grades. Everybody acknowledges that in the primary grades it is perfectly admissible for the teacher to play to the child's interests in her methods of presentation. In fact, it is well understood that with all her ingenuity it will not be possible very long for her to control the wandering attention of her charges. But teachers in the upper grades have not so much time to spend in that way, nor should it be so necessary. Even in the middle grades, the child must come to learn that he has some power over the direction of his attention and that he is expected to exercise it. Or the matter might be stated in terms of the transition from the psychological method of instruction, which prevails in the primary grades, to the logical, text-book method, which prevails in the upper. The effects of this transition fall with full force upon the middle grades, and this is only another of the many reasons why good teaching is at least as important here as anywhere else in the system.

Observational capacity, like memory, has been the subject of a



great many experimental investigations. Bernstein obtained figures showing the development of observational power, or "noting capacity" (Merkfähigkeit), in relation to age. He showed his subjects a group of nine figures on a screen and then gave to each a sheet containing the nine original figures in irregular order, nine others that resembled them somewhat, and seven others which were entirely different. From this sheet of figures the subject was to pick out the ones he had seen in the original series on the screen. The complete results were:

| Age in years. | Total number of identifications. | Number correct identifications. |
|---------------|----------------------------------|---------------------------------|
| 8             | 8.0                              | 6.0                             |
| 9             | 8.0                              | 6.4                             |
| 10            | 8.0                              | 6.6                             |
| 11            | 7.8                              | 6.9                             |
| 12            | 8.3                              | 7.1                             |
| 13            | 8.5                              | 7.5                             |
| 14            | 8.4                              | 8.0                             |
| 15            | 8.8                              | 8.2                             |
| Adults.       | 8.4                              | 7.6                             |

Bernstein's conclusion is that noting capacity improves with increase in age and reaches its maximum in the fifteenth year, after which it shows a decline.<sup>1</sup>

Winch<sup>2</sup> has made one of the most careful and complete studies of observation and report in school children. In his experiment he made use of a colored picture, "Das Frühstück Bild," previously used by Stern in similar experiments. This picture was shown for one minute, after which the child was asked to tell what he had seen in it. The statement then made by the child was free and unprompted in any way, and is referred to by Winch as "the first spontaneous report." After it had been finished, the experimenter

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1. Meumann, E. The Psychology of Learning. Trans. by J. W. Baird, pp. 116-118.

2. Winch, W. H. Children's Perceptions.



asked a number of questions and the child answered them--"the first interrogatory." Exactly one week later, on the same day of the school week, at the same time of day and after the same school lesson as before, without any further exhibition of it, the child was asked once more to tell about the picture--"the second spontaneous report"--after which the questions previously asked were repeated--"the second interrogatory."<sup>1</sup> A summary of the results which are of chief interest is given in the following table.<sup>2</sup> The children here represented were pupils of the boys' and girls' departments of a school in an average neighborhood in the south-west of London.<sup>3</sup>

| Average age.   | First Report | Second Report | Per cent Increase | First Interrogatory | Second Interrogatory | Per cent Increase |
|----------------|--------------|---------------|-------------------|---------------------|----------------------|-------------------|
| Boys.          |              |               |                   |                     |                      |                   |
| 8 yr. 6.2 mo.  | 24.2         | 24.4          | 1                 | 23.9                | 25.0                 | 5                 |
| 9 yr. 4.9 mo.  | 28.4         | 33.2          | 17                | 27.4                | 28.6                 | 4                 |
| 10 yr. 6.1 mo. | 32.6         | 40.1          | 23                | 27.4                | 29.0                 | 6                 |
| 11 yr. 0.7 mo. | 36.8         | 44.7          | 21                | 27.9                | 29.3                 | 5                 |
| 12 yr. 4.3 mo. | 36.8         | 41.1          | 12                | 28.9                | 31.2                 | 8                 |
| 13 yr. 5.6 mo. | 39.3         | 47.8          | 22                | 30.7                | 31.7                 | 3                 |
| Girls.         |              |               |                   |                     |                      |                   |
| 8 yr. 6.6 mo.  | 29.1         | 37.7          | 29                | 25.2                | 26.4                 | 5                 |
| 9 yr. 4.4 mo.  | 32.7         | 41.6          | 27                | 25.7                | 26.9                 | 5                 |
| 10 yr. 5.6 mo. | 39.4         | 47.6          | 21                | 27.8                | 30.2                 | 9                 |
| 11 yr. 6.0 mo. | 52.0         | 58.5          | 12                | 30.7                | 32.2                 | 5                 |
| 12 yr. 6.3 mo. | 65.5         | 73.6          | 12                | 32.8                | 35.1                 | 7                 |
| 13 yr. 6.0 mo. | 64.9         | 73.6          | 13                | 33.8                | 35.6                 | 5                 |

This very interesting and suggestive study shows that observational work of a very high degree of excellence can be obtained from

1. Winch, W. H. Children's Perceptions, pp. 8-9.

2. Ibid, p. 184. The figures are all his, except those for the per cent increase of the second report over the first. I have followed his example (see last column of table) in expressing these in the nearest integer. The scores for the reports and interrogatories represent "numerical estimates on a basis of correct units of observation." (Page 13).

3. Ibid, p. 128.



children of these ages. Particularly interesting is the increase in accuracy between the two interrogatories, which, it will be remembered, were one week apart. This might possibly be, as Winch suggests<sup>1</sup>, the result of his method of requiring from the subject both a spontaneous expression and a careful answering to a thorough examination. Even if this cannot be demonstrated, these results offer valuable suggestions as to the nature of instruction in these grades which are at least well worth trying out and might very well be made the subject of a more extended investigation.

Stern, the chief experimenter in testing observation by means of colored pictures, distinguishes four levels or stages in the development of the child's apperceptive processes. The first stage, which ends at about eight, is the substance stage; in which the child in his report enumerates only persons and things and these in a disconnected way. From about eight to ten is the action stage, when the chief objects of attention are the activities of people. This is followed by the relation stage, when spatial, temporal and causal relations first receive attention. Still later is the quality stage, where the properties of things are observed and analyzed.<sup>2</sup> It will be noted that of these four stages those which fall within the period of the middle grades are the action stage and the relation stage.

In investigating the correlation between age and efficiency in observation, Stern found a very large increase in the volume of

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1. Winch, W. H. *Children's Perceptions*, p. 238.

2. Meumann, E. *The Psychology of Learning*. Trans. by J. W. Baird, p. 122.

Rusk, R. R. *Introduction to Experimental Education*, pp. 69-70.

Whipple, G. M. *Manual of Mental and Physical Tests*, II, p. 33.



spontaneous report with increasing age. Spontaneous description more than doubles in amount between the ages of seven and fourteen. He thinks that increase of spontaneity in observing and noting is one of the most essential characteristics of mental development. It manifests itself also in an increasing power to resist suggestion, the observer being less open to suggestive influence as his spontaneous observation increases in amount.<sup>1</sup>

Much discussion has been evoked as to the nature, development, and degree of reasoning power during the period of the middle grades. General opinion seems to hold that at this stage the power of real reason is not very far developed, and that before about the age of eleven or twelve there are few mental interests. The period is looked upon as more especially a motor period, when the child is learning the use of things, but does not exercise the critical faculties.<sup>2</sup> The existence of this state of affairs seems to be indicated by the nature of children's definitions during this time, which, especially in the first part of the period, show that abstract thinking has but little if any place. The favorite method of definition here is by stating what the thing does or what can be done to it, that is, in terms of use. At about the middle of

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1. Meumann, E. The Psychology of Learning. Trans. by J. W. Baird, p. 138. Cf. Rusk, R. R. Introduction to Experimental Education, pp. 71-72. ----"The progress due to age in the development of observation is very considerable. \* \* \* Whereas with seven-year-old children every third element of positive statement is false, with fourteen-year-old children only every fifth statement is false. Most errors arise with numbers, \* \* then come statements on color, then actions of persons, then descriptions of objects. Space relations and statements on uncolored properties are given almost correctly. This progress with age, like the child's general development, shows periods of advance, of arrest, and of retrogression. With boys the period from 7 to 10 years of age is a time of rapid development, and after that the development is slower. With girls at 10 there is a certain arrest and from 10 to 14 rapid development."

2. Hall, G. S. Adolescence, Its Psychology, I:ix.



the period more definite use is stated, there is some attempt at description, and sometimes use is made of a more general term. Near the close, more of these general terms are used and description is more systematic, but even then abstract words are most often defined concretely by the use of examples. It would seem, therefore, that throughout this period, unless perhaps at the very end, the child's knowledge is largely in the form of concrete ideas or picture wholes, in other words, his thought is distinctly perceptual in type.<sup>1</sup>

"The concrete imagery that characterizes the child's mental processes in the transition period," says Bagley<sup>2</sup>, "continues to dominate the early years of the formative period. Judgment is still largely limited to the practical type, experiences being revived with little attempt at condensation. Especially is it to be noted that any tendency toward symbolism is entirely lacking. \* \* \* In the early part of the formative period, the capacity for logical reasoning is still nascent, although it would seem to make its presence felt in a slight degree at about the age of nine. Its subsequent growth is comparatively slow until the onset of

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1. Kirkpatrick, E. A. *The Individual in the Making*, pp. 195-197. Cf. Rusk, R. R. *Introduction to Experimental Education*, pp. 33-34.----"If we consider the school child only, it may be said that the adult possesses no mental powers which the child of seven does not possess, although in the child these are present in a weaker and less perfect form. These powers, on the other hand, are distributed differently."\* \* \* The child's thinking "must be more concrete and particular than that of the adult; but the child of six to fourteen years of age is capable of being trained in abstraction."

Thorndike (*Notes on Child Study*, pp. 98-104) denies that the adolescent has any specific reasoning capacity over and above that possessed by young children. But Bagley (*Educative Process*, p. 193) says that Thorndike "evidently fails to distinguish between practical and conceptual judgment."

2. Bagley, W. C. *The Educative Process*, p. 193.



adolescence."<sup>1</sup>

A number of studies have been made with the aim of obtaining information upon the development of the power of logical reasoning. At about ten there is to be noticed a pleasure in thinking out logical sequences, starting with the simple causative series of the order of the "house that Jack built."<sup>2</sup> At the age of nine and a half or ten, the number of children who are able to give reasons why they wish to follow such and such vocations rapidly increases.<sup>3</sup>

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1. Miss Lida B. Earhart, on the basis of results obtained from a reading class in the fourth grade of the Speyer School, says that "pupils in the fourth grade are capable of finding problems for themselves, of organizing the lesson, of asking intelligent questions, of forming sensible hypotheses, of exercising judgment as to the statements made by the author, of mastering formal difficulties for themselves, and, in various ways, of exercising initiative wisely and profitably. \* \* \* The results of this series of lessons, coupled with the results of \* \* tests in geography given to the sixth and seventh grades, indicate strongly that pupils in the elementary schools in grades including the fourth, as well as higher classes, are able not only to employ the factors of logical study, but also that by means of systematic effort they can be made to improve in their employment of them."---Earhart, Lida B. *Teaching Children to Study*, pp. 147-138.

Bonser, in his study of the reasoning ability of fourth, fifth, and sixth grade children, devised tests for "mathematical judgment, controlled association, selective judgment, and literary interpretation." He found marked gains in these abilities throughout the period studied. As would naturally be expected, by far the largest gains were in selective judgment and literary interpretation. His study, though extensive, is very loosely organized and throws but little light upon the real question of the nature of the ability to reason during this stage. Naturally enough, he found the above mentioned factors represented in each grade studied and increasingly important from grade to grade. In fact, the chief contribution made by his thesis does not lie within the field which is indicated by its title, but in the related one of variation of ability among individuals within the same grade. He admits that the abilities which he tested are complexes of native ability and school training and says that in the marked gains in per cents for selective judgment, where acquired information is a very important factor, the influence of school training is evident. ---Bonser, F. G. *The Reasoning Ability of Children of the Fourth, Fifth, and Sixth School Grades*, especially pages 14-15 and 88-89.

2. Groszmann, M. P. E. *The Career of the Child*, p. 95.

3. King, I. *The Psychology of Child Development*, p. 187.



Chambers, in a study in the evolution of ideals, found that at the age of six one half the children gave no reason for their choice, at eight the proportion had diminished to one fourth, and at eleven practically every one gave some justification.<sup>1</sup> Taylor found that at seven or eight few children gave any reason at all for their hopes and ambitions, and at nine the only reason given by many was, "I like it."<sup>2</sup> Monroe found that few children of seven or eight gave any reasons for their selection of favorite games, while after thirteen most of them did so.<sup>3</sup> In an investigation of the interest in collecting, Mrs. Burk found that classification and arrangement of collections rarely appeared before the age of eleven.<sup>4</sup>

According to Mrs. Barnes, who made a study of the historic sense among children, the number of inferences rises decidedly at the ages of twelve for boys and thirteen for girls. As to the character of inference at these ages, she says that she found the number of legitimate inferences decidedly pronounced.<sup>5</sup> Lindley found the age of greatest general interest in puzzles to be about twelve, and was not able to discover any sex-difference in this particular. He thinks that this fact goes to show that at about twelve there is a rapid development of the elaborative mental

1. Chambers, W. G. The Evolution of Ideals, Pedagogical Seminary, 10:101-143 (March, 1903).

2. Children's Hopes. Report of the New York State Superintendent of Public Instruction, 1896, Vol. II, pp. 987ff.

3. Play Interests of Children. Transactions of Illinois Society for Child Study, Vol. IV, pp. 5ff. (For these last two references see also Tyler, J. M. Growth and Education, pp. 78-79.)

4. Burk, Caroline F. The Collecting Instinct. Pedagogical Seminary, 7:179-207 (July, 1900).

5. Barnes, Mary S. Studies in Historical Method, pp. 66-67.

6. Lindley, E. H. A Study of Puzzles. American Journal of Psychology, 8:431-493 (July, 1897).



processes and tries to connect it with the growth of brain fibers at this time.<sup>1</sup>

In her study of the application of graded mental tests, Mrs. Squire included a test on judgment, based on a series of five problem questions. The tests began with the tenth year and even in the narrow range from ten to thirteen a marked growth of reasoning power was found. In the tenth year the child was found to be susceptible to the affirmative suggestion and his replies were frequently couched in terms suggested by the question. The eleven-year-old children showed a large percentage of intuitive judgments, and were evidently beginning to think independently, but without clearly formulating the problem in hand. The twelfth and thirteenth years showed a large proportion of reasoned judgments.<sup>2</sup>

Because of the peculiar difficulty of gathering reliable evidence upon not only the development of the reasoning power, but its intrinsic nature as well, it is exceedingly difficult to attempt any generalization. Indeed, very much depends upon just what definition of "reason" is adopted as the standard. It is probably not

1. See above, pp. 30-31.

"Independent reason has its chief pulse of growing life beginning approximately with the same year, twelve, as do these tangential fibers."----Gulick, L. Psychological, Pedagogical, and Religious Aspects of Group Games. Pedagogical Seminary, 6:135-151 (March, 1899).

There is an interesting coincidence here in the fact that twelve is also the age at which Rousseau would have intellectual education begin. "If you could bring your scholar to the age of twelve strong and healthy, but unable to tell his right hand from his left, the eyes of his understanding would be open to reason as soon as you began to teach him."----Rousseau, J. J. Emile, Everyman's Library Edition, p. 57.

2. Squire, Carrie R. Graded Mental Tests. Journal of Educational Psychology, 3:430-443 (October, 1912).



true that there is any sudden outburst of reasoning power at twelve, or at any other definite age. But the evidence goes to show that by the close of the middle grades there is a marked increase in the child's ability to reason and to form judgments, as well as a marked change in the type of his thought processes. Experience may account for part of this, but the investigation by Mrs. Squire which is cited above would contradict such an explanation, because of the narrow range of time over which experience might operate.

The change to which I have referred is that from the perceptual or concrete type of thinking to the conceptual or abstract type. Evidence along several different lines may be gathered together to show that such a change actually does take place, and that the child's reasoning is distinctly perceptual in character until well along toward the close of the period. Meumann cites a long list of investigations, including his own, which show that up to about thirteen or fourteen, children think by means of concrete images of particular objects, persons, and occasions, to which they frequently assign location in space, and sometimes in time.<sup>1</sup> Some of the studies which I have described in this chapter afford similar testimony. Colvin in his study of imagery found that in the more advanced grades concrete imagery tends to fall off and to give place to verbal imagery.<sup>2</sup> Lobsien in his experiment upon types of memory in relation to age, using subjects between eight and fourteen years of age, found that memory for concrete presentations appears before memory for abstract conceptions.<sup>3</sup> Other investigators

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1. Meumann, E. *The Psychology of Learning*. Trans. by J. W. Baird, p. 224.

2. See above, pp. 44-45.

3. Above, pp. 48-49.



have shown that up to the twelfth year, concrete words are better reproduced than are abstract ones.<sup>1</sup> Stern's "relation stage" of report, when relationships of time, space, and cause first receive attention, comes at the end of this intermediate period, and both Mrs. Barnes and Mrs. Squire found marked increase in the power of logical judgment, or inference, at about eleven or twelve.<sup>3</sup> In short, the evidence upon this point seems to be conclusive.

Dewey says that while the process of thinking is essentially the same for little children as it is for adults, there is such a difference in the materials with which the thinking is done that the impression is created that the thinking itself is of a radically different order. The ends which the child has are different, and he has to fall back upon different materials, means, and habits, but the process is exactly the same.<sup>4</sup> It will be observed that Dewey here either uses the word "process" in a very narrow meaning, or the word "exactly" in a very broad one. Granting all that he says, there is still sufficient ground for speaking of a change in type of reasoning, or of development of the power to reason.

I have already referred (p. 54) to the change from the psychological to the logical method of presentation which goes on in the course of the elementary school grades. It also has its connection with this question. The psychological method of the primary grades appeals to the perception, the logical method of the upper grades to the reason, and here again the middle grades must bear the brunt of making the transition from the one to the other.

1. Whipple, G. M. Manual of Mental and Physical Tests, II:188.

2. Above, p. 57.

3. Above, pp. 61-62.

4. Dewey, J. Reasoning in Early Childhood. Teachers College Record, 15:9-15 (January, 1914).



## CHAPTER IV.

## GENERAL TRAITS AND CONDITIONS.

This chapter purposes to take up some of those more general mental traits, attitudes, and interests which either cannot be or have not yet been subjected to experimentation of such a scientific type as have those characteristics which are discussed in the preceding pages. The first part of the chapter will be devoted to school performances and attitudes, while in the latter part will be considered some rather more general traits and conditions.

Of those school subjects toward which there seems to be a characteristic change of attitude during the middle grades the most marked example is afforded by the subject of drawing. Children up to about nine years of age make use of drawing as a natural means of expression, and show as much pleasure in representing a story by its means as in repeating it orally or even in listening to the telling of it. They do not hesitate in drawing from memory but go right to work, drawing rapidly with an interest and abandon which makes up for their lack of technical skill in promise for the future.<sup>1</sup> This spontaneity and vigor of graphic expression, however, shows a marked falling off at about the end of the third grade or the beginning of the fourth. Exhibitions of school work in drawing clearly reveal this, and we have experimental evidence of the same fact in a recent study by H. G. Childs, who measured the drawing ability of 2,177 Indiana school children by a supplemented form of the Thorndike drawing scale and found a long plateau of non-development following

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1. O'Shea, M. V. Children's Expression through Drawing. Journal of Proceedings and Addresses, N. E. A., 1894, pp. 1015-1023.

2. Hall, G. S. Adolescence, Its Psychology, I, p. 184.



the level reached in grade three.<sup>1</sup> His results are completely in accord with studies of children's drawings by Barnes<sup>2</sup>, Lukens<sup>3</sup>, Burk, and Götze, all of whom report a plateau from nine or ten on to adolescence.

A very plausible explanation of this arrest of development in drawing is that at the point where the plateau begins the child has become conscious of his failure accurately to represent the subject of his drawing, that he has learned of the existence of objective standards, and, discouraged because he cannot reach them, ceases to take any further interest in the school work in drawing or at least loses that spontaneity which had characterized his work in the primary grades. This result may be helped to come about by criticism on the part of the teacher, or by the introduction of the requirement of drawing from models and thus breaking the charm of what Lukens calls the "artistic illusion." The zest which he had in his crude drawings is destroyed, but he is not able to draw well enough to care to practice any more, concludes he has no talent, and will not continue his drawing unless under requirement. Most people never get off this plateau, but in many cases there comes a new interest in drawing at adolescence.

Freeman, who has made extensive studies on the subject of hand-

1. Childs, H. G. Measurement of the Drawing Ability of Two Thousand One Hundred and Seventy-seven Children in Indiana School Systems by a Supplemented Thorndike Scale. *Journal of Educational Psychology*, 6:391-408 (September, 1915).

Sargent, W. The Fine and Industrial Arts in Elementary Schools, Grades IV and V. *Elementary School Teacher*, 10:287-300 (February, 1910).

2. Barnes, E. A Study on Children's Drawings. *Pedagogical Seminary*, 2:455-463 (1893).

3. Lukens, H. T. Drawing in the Early Years. *N. E. A. Journal of Proceedings and Addresses*, 1899, pp. 946-953.



writing, thinks that something of the same sort takes place in the development of skill in penmanship, though perhaps not to the same degree. In the primary grades, as in the case of drawing, writing may be looked upon mainly as a means of expression, without the attempt to develop extreme accuracy. The needs of the intermediate grades, however, call for greater speed in writing, and at the same time more stress is put upon accuracy. The child, then, seeing the discrepancy between his rough attempts and the standard which is set before him, easily becomes discouraged and loses interest. Of course he must keep on writing, because of its connection with his other school work, but as a special subject it does not interest him.<sup>1</sup> It has already been pointed out (p. 34) that for physiological reasons movement drill in writing does not become effective before the fourth or fifth grade and there is therefore great need that the interest in the subject be kept alive until that time, in order that the best results may be obtained from the necessary drill. Freeman brought together the results of investigations of handwriting in six city systems and found that in all cases but one there was no improvement in the fifth grade over the fourth and that the two grades above the sixth did not show much improvement over it. This may indicate the fact that pupils become less inclined to drill in handwriting as they reach the upper grades, or it may be simply the result of poor methods of teaching the subject.

Judd maintains that the intermediate grades see a marked change in the child's attitude toward the work in reading. When the fourth grade has been reached, the child, having had extensive training in oral reading, is now for the first time able to use it independently.

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1. Freeman, F. N. Current Methods of Teaching Handwriting. Elementary School Teacher, 13:25-40 (September, 1912). Also by



Only with the fourth grade has sufficient mechanical skill been acquired to admit of the placing of sufficient attention upon the content to make adequate reproduction possible, and by the time the fifth grade is reached such a degree of skill has become quite general.<sup>1</sup> The child at this stage, then, with his attention on the subject-matter, begins to read more rapidly than he did and consequently makes more mistakes in his oral reading. Speed in reading thus acts as an obstacle to formal excellence.<sup>2</sup>

Investigations of arithmetical ability indicate the presence of some irregularity at about the sixth grade. In the autumn of 1902, Rice gave a test consisting of eight problems to some 6,000 children of grades four to eight inclusive, in seven cities. In the grades above the fourth he found wide variations and marked increase in mechanical errors, the fifth and sixth grades especially being points of deterioration.<sup>3</sup> Courtis, in giving tests of various arithmetical abilities to the girls of the Detroit Home and Day School, also found a decrease in the sixth grade, although the same class had had high standing in the fifth grade the year before. On the other hand, a good record was made by the seventh grade, which had during the previous year been considered a bad sixth. He expresses a belief that the causes for this decline in efficiency are

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the same author,-- Some Practical Studies of Handwriting. Elementary School Teacher, 14:167-179 (December, 1913).

1. Schmitt, Clara. School Subjects as Materials for Tests of Mental Ability. Elementary School Journal, 15:150-161 (March, 1914).

2. Judd, C. H. Psychological Characteristics of the Intermediate Grades. School Review Monographs, 3:1-6.

3. McDougale, E. C. A Contribution to the Pedagogy of Arithmetic. Pedagogical Seminary, 21:161-218 (June, 1914).

Rice, J. M. Scientific Management in Education, pp. 100-125.



physical<sup>1</sup>, and in another place suggests that the results in this grade show the operation of some "tendency toward equalization within the mind itself," a vague statement which he does not take the trouble to explain.<sup>2</sup> In tests of arithmetic in Boston, this same irregularity was found in the seventh grade, but since Boston admits children at five years of age, the seventh grade there would correspond in chronological age to the sixth grade elsewhere.<sup>3</sup>

In the field of spelling, the best investigations are those by Cornman and by Wallin. Cornman found his most irregular results in the fourth and fifth school years and for these grades the rise in his efficiency curves is very slight. He suggests that these phenomena may be related to the fact that the fifth year marks a considerable increase in amount and difficulty of subject matter in the course, an increase which is not met by any correspondingly abrupt increase in the physical and mental development of the pupil, and cites the opinion of many competent teachers that the fifth grade thus becomes a "veritable pons asinorum".<sup>4</sup>

Wallin's results substantially agree with those of Cornman. His highest efficiency was found in the fourth grade while Cornman's

1. Courtis, S. A. Measurement of Growth and Efficiency in Arithmetic. Elementary School Teacher, 11:171-185 (December, 1910).

Cf. Lawrence, Isabel. The Course of Study in History in the Common School. Second Year Book of the National Society for the Scientific Study of Education, 1903, pp. 42-44.-----"In the sixth grade, children are known to be resting, both physically and mentally, storing up energy for the great demands made by the pubertal changes."

2. Courtis, S. A. Measurement of Growth and Efficiency in Arithmetic. Elementary School Teacher, 11:360-370 (March, 1911).

3. McDougale, E. C. A Contribution to the Pedagogy of Arithmetic. Pedagogical Seminary, 21: 161-218 (June, 1914).

4. Cornman, O. P. Spelling in the Elementary School: An Experimental and Statistical Investigation, pp. 52-53.



occurred in the third and fourth. Upon the basis of the large amount of variability which he found to exist in the fifth grade, he decides that his results are in accord with Cornman's conclusion regarding that grade and that there is here an element of uncertainty or irregularity in spelling work which needs further study. Because of the fact that he agrees with Cornman in finding the best results at about the fourth grade he suggests that there may be at this period a spelling stage in the child's development, when his memory for word forms reaches a high degree of efficiency. He admits, however, that the phenomena upon which this hypothesis is based may be the result of the simplicity of the words used. Smedley, who took up the question of spelling ability in connection with his experimental work on memory, says that so far as memory is concerned there is no "'memory period,' no period in early school life when the memory is stronger than it is at any later portion of the child's life, a period especially adapted for learning to spell." There may be, however, as Smedley suggests, periods of interest that favor spelling, times when the child is aroused to the feeling that spelling is important.<sup>2</sup>

Cornman, in the citation above given, suggests that these variations in school work at certain points in the intermediate grades may be due to conditions inherent in the organization of the school course. It must be remembered in any attempt to explain these

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1. Wallin, J. E. W. Spelling Efficiency in Relation to Age, Grade, and Sex, and the Question of Transfer, pp. 46-48.

2. U. S. Commissioner of Education, Report, 1902, I:1138.

In a recent investigation of the spelling efficiency of the Oakland, California, public schools "grade 3 was shown to be uniformly the poorest grade, while grade 5 is uniformly the highest." -----Sears, J. B. Spelling Efficiency in the Oakland Schools. School and Society, 2:531-537 (October 9, 1915).



phenomena, then, that there are two sets of factors that must be taken into account. One set has to do with the nature of the school, its organization, methods of presentation and the like. The other set is represented by the nature of the child. These phenomena, therefore, may result from the operation of either of these sets of factors, or, more probably, from the coöperation of both. Now there are two important factors, one on the side of the child, the other on the side of the school, which taken together are sufficient to explain these changes of the child's attitude toward his school work, especially those occurring in the earlier part of the intermediate period. Of course these two factors are not always of equal force, and it is impossible to say at any given time just which is of more significance, but, as I have said, taken together they afford such adequacy of explanation that their importance cannot be doubted. I shall defer stating that factor which is of most importance on the side of the child until I have considered some of his reactions toward conditions not so intimately connected with the formal work of the school as are the various branches of the subject matter. On the side of the school, however, these changes of attitude can largely be accounted for by that feature of the work of the middle grades to which I have already made several references,--the change from the psychological to the logical method of presentation.

This change probably comes earlier, or is sooner noticed, in the case of drawing and penmanship than for other subjects, and has its influence in producing that lack of interest in these lines of school work which was discussed at the beginning of this chapter. This does not mean that it is necessarily untrue that the child develops the ideal of standards and becomes discouraged because he



cannot reach them, but that this change serves as one of the means, and a very important one, by which such a condition is brought about. It is the transition from the free to the formal, from the spontaneous to the controlled, from the language to the grammar of the art, that results in the loss of interest. It is a step which must be taken, but it requires most skillful management on the part of the teacher that the transition be made and progress and interest in school work be maintained. More especially is this true in consideration of the nature of the child, who at this time, as will be shown later, is beginning to come into possession of characteristics which work on the side of this disturbing factor of change of method.

There seems to be evidence for the belief that at about eight or nine years of age there is the beginning of real interest in details, and that at this time the notion of skill is of conscious importance for the first time. The interest thus begins to shift from the mere pleasure of the act itself to the result that the act is intended to accomplish. Hence the element of success becomes a very prominent factor in determining interest and the child, more than at any other period, is unwilling to attempt even simple tasks unless he feels reasonably sure of a successful issue.<sup>1</sup> Triplett found that the years from seven to nine are characterized by frequency of loss of interest in school work and of failure, and that the child here feels his lack of success and easily becomes discouraged or forms habits of hesitation and inertia.<sup>2</sup> Bagley says that the "dislike for monotony and for 'staying with' a task is especially strong at this time. Perhaps it is largely for this

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1. King, I. The Psychology of Child Development, p. 181.

2. Tyler, J. M. Growth and Education, p. 144. Tyler does not give place of original reference to Triplett and I have not been able to locate it.



reason that the average pupil finds the intermediate grades so irksome. Here, more than anywhere else, the teacher has constantly to battle against nature. On every hand, the stimuli that solicit passive attention must be strenuously, often forcibly resisted."<sup>1</sup>

The middle grades, especially the fourth and fifth, have the reputation of being dry and uninteresting, hard to manage, and difficult to teach.<sup>2</sup> The fifth grade has been called a failure,--a time when the work of the school is less adapted to the nature of the pupil than at any other.<sup>3</sup> The restlessness of the children, especially the boys, in these grades is sometimes presented as one of the reasons for this state of affairs. Anyone who has ever had any experience with fourth or fifth grade children will at once recognize Colvin's description of a type of restless movement which they often exhibit. "If they are given a series of words to commit to memory, they manifest in the learning all sorts of bodily contortions and facial grimaces. They wrinkle their foreheads, twist their mouths into unusual shapes, strike the fist of one hand into the palm of the other, and move about in their seats."<sup>4</sup> Colvin says that these movements are manifestations of poor and incomplete adjustment to the object of attention, and that this attitude is not effective for learning, the less so because it is very likely to be

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1. Bagley, W. C. The Educative Process, p. 192.

2. Arnold, F. The Unit of Supervision, Cost, and Efficiency. School and Society, 2:1-11.

Buellesfield, H. Causes of Failures among Teachers. Educational Administration and Supervision, 1:439-452 (September, 1915).

Crosswell, T. R. Amusements of Worcester School Children. Pedagogical Seminary, 6:314-371 (September, 1899).

3. Groszmann, M. P. E. The Career of the Child, p. 97.

4. Colvin, S. S. The Learning Process, p. 168.



accompanied with a considerable degree of emotion.

Those who make such statements about the difficulties of these grades as those which have been cited almost invariably do so without giving any reason, just as if they were presenting assured matters of fact. At any rate, the idea seems to be universal that such conditions are typical of these grades. And yet in the face of this prevalent opinion it seems to be the case, as far as our evidence goes, that in just these most difficult grades are found the poorest teachers. There may be two factors at work here, and in coöperation. The pooriness of the teaching may help explain the undesirable attitude of the pupils and vice versa.

In his study of the incidence of retardation, Blan found that of those children now in the eighth grade a larger percentage repeated in the fifth than in the fourth, a larger percentage in the sixth than in the fifth, and a larger percentage in the seventh than in the sixth. From these circumstances he argues that the grades become increasingly more difficult from the fourth to the seventh.<sup>2</sup> Statistics of retardation and elimination are difficult to deal with and furnish very unsatisfactory bases upon which to erect a substantial hypothesis. Ayres<sup>3</sup> is convinced that there is abundant evidence that it is the general tendency to hold practically all of the pupils until the sixth grade. He gives 85% as the promotion rate for grades three, four, and six; and 83% for grade five. The average promotion rate for the eight grades is 84%, so the middle grades, with perhaps the exception of the fifth, would appear somewhat better in this respect than the rest of the school. Ayres and Thorn-

1. See above, pp. 7-8.

2. Blan, L. B. A Special Study of the Incidence of Retardation, pp. 103, 108.

3. Ayres, L. P. Laggards in our Schools, pp. 70, 143, 169.



dike agree that age is the important factor in elimination. Thorndike<sup>1</sup> says that 10% of fourth grade pupils do not continue to the fifth, 16% of fifth grade pupils do not go on to the sixth, and 20% of sixth grade pupils do not get into the seventh. There seems to be no foundation in fact for Judd's statement that "there is an enormous migration from our schools at this part of the course," or for his assumption that this migration is largely due to non-promotion and subsequent discouragement.<sup>2</sup>

Keyes, in his study of progress through the grades of city schools, found that the third, fourth, and fifth grades are the ones most frequently made up, as well as the ones most often repeated. These three grades, then, are places of high exposure to arrest, and, on the other hand, of great opportunity for acceleration. They mark the period of extreme variability within the elementary school course. On the side of the superior pupil, the middle grades are places fitted to give him a chance to work up to the healthful limit of his powers. For the weak pupil, they are places where he needs the most watchful care and sympathetic insight on the part of his teacher. The children of these grades require, if not the most skilled teachers of the staff, teachers who are as well prepared for the special problems of these school years as primary and grammar grade teachers are, through force of common opinion, required to be for their particular duties. There is no place in the middle grades for the mediocre teacher.<sup>3</sup>

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1. Thorndike, E. L. The Elimination of Pupils from School. U. S. Bureau of Education, Bulletin 1907, No. 4, pp. 17, 24.

2. Judd, C. H. Psychological Characteristics of the Intermediate Grades. School Review Monographs, 3:1-6.

3. Keyes, C. H. Progress through the Grades of City Schools, pp. 34, 52, 58, 62. See also Schmitt, Clara. Retardation Statistics of Three Chicago Schools. Elementary School Teacher, 10: 478-492



So far this chapter has dealt only with conditions closely connected with the school and its work. The remainder of it will be devoted to a consideration of certain traits, which, although of course not unrelated to school life, have a somewhat wider range of application.

Several very interesting observations, coming from different lines of evidence, have been made concerning conditions found to exist at about the age of eleven. It would almost seem that at this time there is a sort of resting place, or neutral stage, where children exhibit great similarity, as if it were an attempt on Nature's part to strike a level from which all children might emerge into the differentiating processes of the pubertal period. President Hall might explain this as representing an ancestral old age, as the whole intermediate period would represent a former stage of maturity. Rusk says that "the eleventh year is especially unfavorable to mental development."<sup>1</sup> The figures for growth in height and weight show that at this age boys and girls are practically on an equality in these particulars.<sup>2</sup> Pyle's table of norms for verbal memory shows that at eleven boys and girls make the same record, and this holds for both the concrete and the abstract list.<sup>3</sup> Gilbert's tests showed

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(January, 1910). She finds that the grades most often repeated are those between the second and fifth, inclusive. Those most often skipped are 1A, 2A, 3, 4A. The third and fourth grades appear in both groups, "indicating that it is in those grades that the most re-adjustment takes place."

B. Q. Hoskinson, in a study of the school progress of gifted children, found that grades two and four led in number of skips, each having the same number, followed by grade seven. (From an unpublished study on file in the library of the University of Illinois.)

1. Rusk, R. R. Introduction to Experimental Education, p. 33.
2. See above, pp. 16, 19.
3. See above, pp. 47-48.



that all children on an average are of about equal ability at eleven, this age being a sort of neutral point when not only sex-differences but differences within the same sex tend to fade out.<sup>1</sup> "At eleven, boys and girls, bright and dull, are more nearly alike than at any other time. It seems to be Nature's rendezvous for evening up accounts of all kinds before the new life begins after twelve."<sup>2</sup>

In connection with the child study movement, which under the patronage of President Hall and his associates acquired such great vogue some fifteen or twenty years ago, a large number of studies were made on children's interests, hopes, and ideals. Although much of this work was very carelessly and unscientifically done, and the usual means of acquiring data was by the much-criticized method of the questionnaire, in many cases results of real significance were obtained. Particularly interesting are those studies concerned with children's hopes and ideals, as showing development and change in type with increasing age. The ideal is of such importance and has so large a place in the mental life that any information as to its nature is exceedingly valuable from the standpoint of education.

Taylor obtained compositions from 1,000 boys and 1,000 girls of the State of New York, written as a part of the regular language work of the public schools on the subject, "What I wish to do when

1. Gilbert, J. A. Researches on the Mental and Physical Development of School Children. Studies from the Yale Psychological Laboratory, 2:40-100 (November, 1894).

2. Manny, F. A. The Dividing Line between Secondary and Elementary Schools. Educational Review, 38:461-468 (December, 1909).

"At eleven boys and girls and bright and dull pupils are almost alike in all respects. This age seems to be a neutral ground, a resting place, where all child-humanity meets on equal terms."  
 -----Tanner, Amy E. The Child: His Thinking, Feeling, and Doing, p. 283.



I am a man (or woman), and why." These compositions, arranged by age groups, show the following characteristics: at seven, replies are couched in general undefined terms and the question "why" is ignored; at eight no more give a reason for choice and here the trades have their greatest popularity; the desire of the girls to be teachers culminates at nine and so does the choice of the father's or a relative's occupation among the boys, circumstances which are significant when taken with the fact shown above (pages 43-44) that it is at this age that suggestibility reaches its height. Altruistic desires, usually for the welfare of parents, enter at twelve, and here also is the first appearance of reflection upon the uncertainties of life. At thirteen, girls prefer to become dress-makers, clerks, and stenographers, rather than teachers.<sup>1</sup>

As a result of the study of the ideals of 1146 boys and 1187 girls of New Castle, Pennsylvania, Chambers finds that acquaintance ideals fall off from 46% at eight to 10% at twelve. Just as these domestic and local ideals diminish in number, historical and public personages as ideals increase to take their place. Ideals of this class rise from 39% at eight to 78% at twelve. The desire for wealth is most frequently expressed at ten and thereafter steadily diminishes. Eleven marks the high point of the wish for honor, position, or greatness, but this curve shows but little variation for either sex between nine and fourteen. Boys and girls show the same tendencies in regard to the wish for riches or honor.<sup>2</sup>

A more recent study of the same nature is that made by Hill,

1. Taylor, J. P. A Preliminary Study of Children's Hopes. Annual Report New York State Superintendent of Public Instruction, 1895-1896, p. 1012 et seq.

2. Chambers, W. G. The Evolution of Ideals. Pedagogical Seminary, 10:101-143 (March, 1903).



who investigated the ideals of 1,431 white children of two public schools in Nashville, Tennessee. This study shows the same decline in acquaintance ideals and the same compensating increase in the public and historical type as does the New Castle study. Between the ages of seven and fifteen inclusive, which mark the limits of the study, 9% of the boys and 32% of the girls choose ideals of the opposite sex. This tendency, in case of the boys, is greatest in the earlier years, reaches its maximum at eight, and practically disappears at twelve. With girls, on the contrary, there is an increase with age and the maximum is reached at twelve, after which the fall is only slight to the last year studied.

Hill does not at all agree with the idea that the choice of parents and acquaintances as ideals indicates narrowness of life, or that the rapid expansion of ideals is a desirable phenomenon. On the contrary, thinks Hill, where the home life is good, to select such ideals seems to be desirable and in that case to make a large and very early choice of public or historical characters might not show normal development but rather disillusionment and precocity. Hill would like to see the percentage of choice of parents as ideals even higher at all ages than it is. Neither is he alarmed, as some are, by the fact that so large a percentage of girls choose male ideals, for he thinks that it is not so much due to any peculiar dissatisfaction with sex as to simple imitativeness of the most vivid examples. There are more male ideals to choose from, or at least not enough stress is put upon the lives and deeds of great women.<sup>1</sup>

Despite numerous deviations, there is revealed a definite

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1. Hill, D. S. Comparative Study of Children's Ideals. Pedagogical Seminary, 18:219-231 (June, 1911).



process of development with age in the choice of an ideal. Younger children always show preference for the nearer ideals,--persons of their families and immediate acquaintances. This preference gradually decreases, while the choice of historic persons and contemporary public characters increases. Likewise, the values emphasized by younger children are material ones like wealth and prosperity; with older ages appear intellectual and moral values.<sup>1</sup>

Mrs. Burk studied the development of that particular form of the property interest which appears as the so-called "collecting instinct." Her results are shown in the following table, from which it will be seen that this interest reaches its height during this period, culminating at about the age of ten. The data of the study were obtained from 607 boys and the same number of girls.<sup>2</sup>

| Age. | Average number<br>of collections. |
|------|-----------------------------------|
| 6    | 1.4                               |
| 7    | 2.3                               |
| 8    | 4.2                               |
| 9    | 4.0                               |
| 10   | 4.4                               |
| 11   | 3.3                               |
| 12   | 3.0                               |
| 13   | 3.4                               |
| 14   | 3.0                               |
| 15   | 3.0                               |
| 16   | 2.3                               |
| 17   | 2.5                               |

The period of the middle grades is one in which the child discovers his own individuality, his own power, and his own needs. The idea of social coöperation does not come with any degree of appeal until at least well along toward the close of the period. The individual, not the social unit, is the object of attention. The

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1. Meumann, E. Vorlesungen, II, pp. 620-628.

2. Burk, Caroline F. The Collecting Instinct. Pedagogical Seminary, 7:179-207 (July, 1900).



child is self-centered, and his motive in life seems to be to get things done for himself, and, when possible, to do them for himself. His problems must grow out of his own immediate interests, and social requirements must be explained to him in terms of his own relationship to them.<sup>1</sup>

This individual type of interest seems to come to a height at about ten or eleven. At about the end of the tenth year the feeling of caste, or the idea of social station, appears to reach its culminating point of expression.<sup>2</sup> Mrs. Burk's table, given above, shows that the interest in collecting has its greatest force at ten, and in so far as this includes the idea of ownership,--the sense of "mine-ness," it connotes the feeling of individuality. Chambers, in his study of ideals (above, page 78), found that the wish for honor, fame, and greatness reached its maximum at eleven. Kratz attempted to discover the characteristics of the best teacher, as recognized by the children. All the third-grade children specified helpfulness as one of the characteristics of the best teacher, but at the seventh grade the number had dropped to 40%. On the other hand, the virtue of patience was specified by 4% of third-grade children and 14% of those in the seventh grade. These figures may be interpreted as revealing the growth of the idea of independence during this time.<sup>3</sup>

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1. Chancellor, W. E. Order of Development and Studies Suited to each Age. N. E. A. Journal of Proceedings and Addresses, 1907, pp. 210-221.

Judd, C. H. Studies in Principles of Education. Elementary School Teacher, 13:146-153 (November, 1912).

2. Sheldon, H. D. The Institutional Activities of American Children. American Journal of Psychology, 9:425-448 (July, 1898).

3. Kratz, H. E. Studies and Observations in the School Room, p. 50.



The cumulative testimony from these different lines of evidence leads us to the conclusion that the period of the middle grades is one in which the child's notion of his individual value and of his personal rights is greatly enlarged. Many circumstances contribute to this end. The efficiency of the child's body, his sturdiness and health, his general feeling of well-being, give him a feeling of self-reliance and independent capability. He has reached a time in life when he feels able to do things for himself. More than this, he begins to see that he is expected to do things, instead of having everything done for him,--that he has a place that is distinctively his in the general scheme of things,-- and this, too, serves to increase his sense of himself as an individual and of individual importance. He is no longer completely under the dominance of the home, but mingles with his schoolmates,--his equals,--some of whom he is able to influence, whereby he gets a taste of the pride of place. Instead of being forced always to listen to commands and to obey, he begins to give commands of his own, or at least to join in counsel where he cannot command.

At about eight or nine, games requiring the participation of many individuals begin to receive interest, but not until later is there any real coöperation. The child plays with others, but at first he plays as an individual. The instinct of emulation is still strong, and although the child takes part in group games, he is always seeking opportunity to display his own particular prowess, and is rarely willing to sacrifice to the good of the group his own opportunity for distinction. This lack of a social attitude renders it necessary that moral training at this time consist in the inculcation of specific moral habits.<sup>1</sup>

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1. Crosswell, T. R. Amusements of Worcester School Children. Pedagogical Seminary, 8:314-371 (September, 1899).



The associated activity and community of purpose demanded by group games do, however, slowly implant the notion of social coöperation and along with this the beginnings of the social consciousness have their rise. Another way in which the growing social interest begins to show itself is in the joining, or even founding, of societies of different sorts. Boys show a tendency toward organizing gangs. Girls, who show less interest than boys in coöperative games, are also less interested in clubs, and after the "neutral" age of eleven divergencies between the sexes develop with great rapidity.<sup>1</sup>

At an earlier part of this chapter (pages 70-71) it was stated that the difficulties appertaining to this period of school work could be explained very largely on the basis of two factors, the one connected with the nature of the child, the other pertaining to the nature of the school. The latter of these was at that time discussed and its influence pointed out. The factor on the part of the child is that which has just been shown to reach its height at the time of the fourth or fifth grade, those grades which by common consent are regarded as most difficult of management. It is the individualistic or self-assertive attitude of the child. The existence of this one characteristic is by itself sufficient to explain very many conditions which by some have been set down as independent characteristics of this period and, as I have said before (page 72), it is by nature eminently fitted to coöperate with the contemporaneous transition in method as an added source of disturbance.

The interests of primary children are general, not objective, and in very few cases do they question the teacher's authority over

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1. Welton, J. The Psychology of Education, pp. 229-230.



them. They seem instinctively to realize their own weakness,-- at least the idea of power does not come to them. Their time is occupied in the effort of approximating the pattern which is put before them, and they are docile in their submission to the school's requirements in management, methods, and subject matter. But by the time the child has reached the fourth or fifth grade conditions have radically changed. His body is stronger, his health is better, and he has better control of his movements. He has acquired some skill in the arts which he has been pursuing, and some power over the more purely intellectual matter which he has been studying, and is anxious to make use of his new acquisitions in lines of his own interests and ways of his own devising. He has learned that he is superior to some of his fellows in certain ways, and begins to try out his authority over them. The taste of his own power leads him to resent control which seems to him too exacting and he begins to chafe under restriction. The general restlessness of the period, due to the excess, or rather the incoördination of energy, combined with the still fluctuating nature of the attention, makes very difficult his proper adjustment to the work of the school. He finds the work of these grades monotonous and irksome, and in consequence is likely to adopt an attitude of indifference, if not of antagonism.

Unfortunately, in many cases, he realizes that the teacher has not complete control over him, as he thought while in the primary grades, and he begins to doubt and question her authority. Instead of setting up standards for himself, and becoming dissatisfied because he cannot reach them, as Judd<sup>1</sup> suggests, it may be the case that he simply decides that the work in drawing, or reading, or whatever it may be, is beneath his dignity,--a thing which is not at all

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1. Judd, C. H. Psychological Characteristics of the Intermediate Grades. School Review Monographs, 3:1-6.



uncommon and is very likely to happen unless careful means are taken to prevent it. This attitude toward his school work and his teacher, coupled with his new feeling of power and his desire for the admiration of his mates, is sufficient to account for the great majority of the ordinary disciplinary troubles in these grades. Real social values make no appeal to him. He is occupied with his own affairs, seeking his own ends.

Of course these tendencies do not reach the same extent of development in every child, but, under normal conditions, the average child of the middle grades possesses this self-assertive and self-interested attitude to a degree sufficient to make him often appear to be selfish or impudent, when he really has not even the remotest consciousness or intention of being so. In saying this, I do not mean to imply that the teacher in the middle grades must make no attempt to correct any manifestations of selfishness or impudence, even when only apparent, or must calmly endure them when directed toward her, but I do mean that she should be able to discriminate among cases on the basis of intent, and that in many instances these offences should be corrected as mistakes and not punished as if they were deliberate trespasses. This is only another reason why in these grades particularly wise and skillful teachers are necessary, for the teacher here must have wisdom to judge, and firmness to correct. She must understand the nature of the child, and make allowances in the light of her knowledge, but she must not be carried so far by her sympathies as to be blind to mistakes which must be corrected, or unable to recognize and deal promptly with cases of real infraction.



## CHAPTER V.

## GENERAL CHARACTERIZATIONS.

The material presented in the preceding chapters has been obtained for the most part by gathering from general psychological and physiological studies such information as might apply to the period which forms the subject of the present investigation. A number of writers, however, have attempted characterizations of the period as a whole, and this chapter serves to review the more important of these general characterizations.

Of the attempts to characterize and explain the period of the middle grades, that by President Hall is the most comprehensive. He says: "The years from about eight to twelve constitute a unique period of human life. The acute stage of teething is passing, the brain has acquired nearly its adult size and weight, health is almost at its best, activity is greater and more varied than ever before or than it will ever be again, and there is peculiar endurance, vitality, and resistance to fatigue. The child develops a life of its own outside the home circle, and its natural interests are never so independent of adult influence. Perception is very acute, and there is great immunity to exposure, danger, accident, as well as to temptation. Reason, true morality, religion, sympathy, love, and esthetic enjoyment are but very slightly developed. Everything, in short, suggests the culmination of one stage of life as if it thus represented what was once, and for a very protracted and relatively stationary period, the age of maturity in some remote, perhaps pigmoid, stage of human evolution, when in a warm climate the young of our species once shifted for themselves independently



of further parental aid."<sup>1</sup> In another place he proposes a genetic explanation of this period which he here refers to as the "period of retardation." He says that it "represents a relative balance between assimilation and expenditure and, what is far more important, between fundamental growth of the large bones and muscles and accessory development of the smaller and more peripheral parts and functions. Indeed, the boy of ten or eleven is tolerably well adjusted to the environment of savage life in a warm country where he could readily live independently of his parents, discharging all the functions necessary to his personal life, but lacking only the reproductive function. In his instincts, amusements, and associations, his adjustment to such an environment is quite stable."<sup>2</sup>

As to psychological conditions during this time, "never again will there be such susceptibility to drill and discipline, such plasticity to habituation, or such ready adjustment to new conditions. It is the age of external and mechanical training. \* \* \* The method should be mechanical, repetitive, authoritative, dogmatic. The automatic powers are now at their very apex, and they can do and bear more than our degenerate pedagogy knows or dreams of. \* \* \* The greatest stress, with short periods and few hours, incessant insistence, incitement, and little reliance upon interest, reason, or work done without the presence of the teacher, should be the guiding principles."<sup>3</sup>

1. Hall, G. S. *Adolescence, Its Psychology*, I:ix-x.

"Whatever truth there may be in this hypothesis, it still remains as the most illuminating and satisfying explanation of the pre-adolescent child that has yet been offered."---Bagley, W. C. *The Educative Process*, p. 195.

2. Hall, G. S. *Op. cit.*, Vol. I, p. 44.

3. *Ibid*, p. xii.



This description is entitled to much consideration, not only because it is carefully worked out, but also because its author has made a careful study of physiological and psychological data and has used such data as his basis. He has also had the advantage of a vast amount of material collected through investigations in child study and has generalized upon the results of these investigations with rare insight. This characterization of the mental and physical traits of the period has been used as the basis of most of the descriptions of it by other writers. His "genetic explanation" of the period, however, is the product of speculation, and, ingenious and interesting as it is and attractive and satisfactory as it may seem, it must after all be regarded strictly in that light. It is doubtful if his explanation has really added any weight to his argument for the distinctive characteristics of the period. It may very well be that his characterization, which, as I have just said, is really well-founded upon substantial evidence, has obtained a less respectful hearing in many quarters than it might have had, had it not been accompanied with this attempt to account for the nature of the period on phylogenetic principles, which really adds nothing to the description itself, as such.

A recent English writer upon educational psychology offers the following comment. "The term 'age of stability' was applied by Professor Stanley Hall to the period in the child's life intermediate between infancy and adolescence. At this age the development of the child's body has reached a temporary perfection. The body is not finished, but it is perfect in a small way. It is not the body of a modern man, but, according to Stanley Hall, it is the body of a pigmy, and as such remarkably efficient. It is unnecessary to accept unreservedly Professor Stanley Hall's interpretation



of the 'Culture Epoch Theory,' but his observations are undoubtedly correct in showing that the young school-boy's body is a remarkably efficiently proportioned instrument of action. At the same time in this age of stability, extending over the years eight to twelve, there is an extremely accurate balance between energy and power of expression. The boy's physical capabilities are exactly sufficient to express fully his mental life. Hence intellectually this is an extremely practical age. The boy's mind is set upon the needs of action. It is the age during which motor skill is acquired. \* \* \* The boy's mind runs upon making and doing. \* \* \* But he is not a scientist nor an author. His subjective life is practically nil except for the imagination of tomorrow's round."<sup>1</sup>

This author gives no information as to the nature of the evidence upon which he bases his assertion that the "boy's physical capabilities are exactly sufficient to express fully his mental life," and it would seem to be no more than a dogmatic assertion, and a very obscure one at that. The balance between energy and power of expression is not nearly so perfect as he would have us believe, or there would not be that restlessness during this period which is the symptom of what is, in effect, excess energy, and which could just as well be said to be seeking expression which is denied it because of the lack of coördination.

Bagley, who has given as much attention as anyone to the principles and practices of education as applied to the intermediate grades, calls the period from eight to twelve the "formative stage." He describes it as a period of relatively slow growth and of comparative immunity to fatigue and disease. By the beginning of this stage of development, the brain has practically reached

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1. West, M. Education and Psychology, pp. 273-274.



maturity, as far as size and weight are concerned, and subsequent changes are such as are due to internal organization. "Expressed in another way, this means that the years eight to twelve are the 'habit-forming' period, for habit, on its physiological side, is the making permanent of pathways of nervous discharge."<sup>1</sup> The essential mental characteristics of the child during these years are "(1) his dislike for sustained effort, (2) his slight capacity for 'reasoning,' and (3) his marvelous retentiveness both for verbal forms and for vivid pictures."<sup>2</sup>

The idea that this period is one of peculiar excellence of memory has been discussed at length in a preceding chapter (pages 51-52) and it is unnecessary to go into the matter again, more than to repeat that this retentiveness is very likely due more to the relative poorness of the association factor at this time than to the absolute excellence of the retentive ability. Bagley's characterization shows the influence of Hall, as do those given in the next paragraph.

Perry calls the final period of infancy a "plateau, mental and physical." "The child at this age," he says, "is independent, sturdy, and self-interested. He is living more completely than ever under the spell of the self-preservative instinct and its social and adaptive corollaries. \* \* \* It is preëminently the period for drill work. Now is the time to get the most out of the child on the formal side of education."<sup>3</sup> Pyle says that the period is one of fair stability,--that for "some four years the child is a fairly

1. Bagley, W. C. The Educative Process, pp. 186-191.

2. Bagley, W. C. Geography in the Intermediate Grades. Montana State Normal College Bulletin, Vol. 5, No. 6 (August, 1904).

3. Perry, A. C. Discipline as a School Problem, pp. 109-116.



complete and perfect individual and meets his environment in a fairly settled way, till a new birth and a new life come with the dawn of adolescence;"<sup>1</sup> and Colvin says that "the years roughly from eight to twelve are years of a low-grade stability, a period of habituation and building up."<sup>2</sup>

Although most of the formulations of the characteristics of this period have been based upon physiological distinctions, such as development of bodily structure or of organization of the nervous system, some writers have thought the more significant characteristics to lie in other fields, especially in the nature of the prevailing interests. Thus Claparède calls from seven to twelve the "period of special and objective interests," in contrast with the "period of general interests" which precedes it, and the "period of ethical and social interests" which follows it.<sup>3</sup>

Bachman invents for the name of the period the term "period of the conceptual will," a phrase which is not particularly happy. It is thus distinguished from the "period of the perceptual will" which immediately precedes it. What Bachman evidently is trying to emphasize is that transition from the perceptual to the conceptual type of thinking which I have already described (page 63), and there is no particularly good reason why he should connote this with the "will." He says that in this period "the elements on the side of the will are, on the one hand, those instincts of childhood that continue to impel to action, such as pugnacity, selfishness, hunger,

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1. Pyle, W. H. The Outlines of Educational Psychology, p. 100.

2. Colvin, S. S. The Child's World of Imagination. Elementary School Teacher, 6:327-342 (March, 1906).

3. Claparède, É. Experimental Pedagogy and the Psychology of the Child. Trans. by Louch and Holman, p. 174.



cold, imitation, play, acquisitiveness, and the constructive instinct, and, on the other, those instincts more especially distinctive of boy-girlhood, such as the social and group instinct, increased curiosity and growing love of knowledge, a broader interest in the beautiful, a deeper sense of right and justice, and at least the early stirrings of the religious impulse. On the side of the intellect, there become active in this period, the more developed aspects of attention, association, dissociation, memory, imagination, and especially conceptual reasoning."<sup>1</sup>

Kirkpatrick calls this stage the "period of competitive socialization,"---- a period when "the child is introduced to a wider social environment and in which the impulses to excel in competition are prominent and are brought out in association with others of the same age." It is not a time of "marked internal changes in any way, but one in which the external, social, and regulative influences are very prominent and the individuality of the child is to a greater or less extent brought into harmony with other individualities and with social customs. The most prominent new tendency that appears during this period is the tendency to compete with others along all lines. \* \* \* During this period the physiological changes are comparatively slight. The child's growth is slower than formerly and is nearly the same each year throughout the period. \* \* \* No new organs begin to function during this period, but all gradually increase in size in more nearly the same proportion than at any other period. The infinite number of sensory-motor activities already being carried on are developed and better coördinated. \* \* \* During no period before this are there so few changes in the instinctive tendencies of the child, hence the

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1. Bachman, F. P. Principles of Elementary Education and their Application, p. 95.



tendencies already present may be directed in any line desired and to almost any extent. It is peculiarly a time for forming habits and acquiring knowledge."<sup>1</sup>

Kirkpatrick's paradoxical name for this period is probably intended to point out the struggle which takes place during this time between the child's individualistic and emulative attitude on the one hand, and the regulative forces of his social environment on the other. The reason which he gives for making a drill period of this stage is one which I have been unable to find expressed anywhere else, nor does he give any evidence or argument in support of his statement of the adaptability of the instinctive tendencies during this period, but the theory, as such, seems very plausible. The prominence of the social and regulative influences at this time is relative, rather than absolute, and is brought about by the fact that the development of the child's individuality has now come to a place where it must begin to be curbed, in other words, it has reached a point where it comes into contact with the limitations set by the nature of the social life.

Judd, in his book on the psychology of high school subjects, devotes a paragraph to the psychological characteristics of the intermediate grades, in which he makes use of the social attitude as a criterion. He says: "There lies between the earlier social interest exhibited by the child in the primary grades, and the later period of adolescence, an intermediate period in which the interests of the child are not primarily social. If one watches the development of the children in the elementary school, he finds that after a period of compliance with all sorts of social demands during the first three years of school life little children exhibit a type of

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1. Kirkpatrick, E. A. *The Individual in the Making*, pp. 60, 166-167, 169.



independence which they do not exhibit in the primary grades. After the child has learned to read, for example, in the first two or three grades, he begins to be independent of the school's attitude toward reading, and he begins to want to read something for himself. The type of material which he selects becomes more independent in character, and he very frequently seems to be out of joint with the school's requirements. It can be shown that the fourth and fifth grades are centers of the greatest incoördination in school work. Children fail of promotion and drop out of school in larger percentage than at other points in the school system. In matters of discipline the fourth-grade or fifth-grade boy is likely to be wholly unsocial in his attitude. During the early years he has been obedient without very much question. No one ever finds a second-grade or third-grade child insubordinate to the school's discipline, but in the intermediate grades the child begins to realize his independence of society by trying experiments to see what will happen if he does not comply with the rules of the class-room."<sup>1</sup>

Here again is a recognition of the development of individuality and lack of social attitude, which characterize these middle grades, as factors of disturbance. The matters of discipline to which Judd refers may be the result of a planned exhibition of independence, as he seems to wish us to infer, or they may be the natural outcome of the circumstance that the individuality of the child has developed to a degree where it becomes a source of maladjustment, because not yet inhibited by the necessary growth of a social

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1. Judd, C. H. Psychology of High School Subjects, pp. 496-497.

Also, by the same author, Psychological Characteristics of the Intermediate Grades. School Review Monographs, 3:1-6.



consciousness as the result of social experience. Much of the disciplinary trouble of the middle grades seems to be the result of a real oversight or ignorance of the rights of others, without any real intention on the part of the child to create a disturbance by way of experiment or for the purpose of displaying his independence. It is true, however, that along with this the other thing may happen and it is very difficult sometimes for the teacher to make a proper discrimination.

Judd's assertion that children fail of promotion and drop out of school in the fourth and fifth grades in larger percentage than at other points in the school course is not in agreement with the statistics as I find them (above, pages 74-75) and he does not go to the trouble to give any indication as to the nature of the evidence upon which he bases these conclusions. Elimination in these middle grades is conditioned by over-age<sup>1</sup> and affords no basis upon which to generalize about the psychological characteristics of the normal child in these grades.

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1. Ayres, L. P. Laggaras in Our Schools, p. 169.

2. Thorndike, E. L. The Elimination of Pupils from School. U. S. Bureau of Education, Bulletin 1907, No. 4, p. 24.



## CHAPTER VI.

## SUMMARY.

Herewith is presented in compact and outline form the conclusions reached on the basis of the evidence brought together in the course of this study.<sup>1</sup>

I. The period of the child's life between the years of eight and twelve is one of retarded physical growth, forming a plateau bounded by periods of more rapid rate.

This is shown by the tables of growth in height and weight by Burk, Smedley, and Baldwin; especially by those of Burk, which, being based on a very much larger number of cases than are the others, are more significant and trustworthy (pages 18, 20).

II. The slow and steady growth of the body and its internal organs during this period sets free an amount of energy which would otherwise be expended in the process of growth, whereby there is more energy at the child's disposal, in proportion to his weight, than at any other time.

This is on the authority of Crosswell, Hall, and Bagley (pages 25-26).

III. The period is one of sturdiness and health of body and of exceptional power to resist disease.

Evidence for this is obtained from the researches of Hartwell and from mortality statistics from the United States Census Bureau (pages 26-27).

IV. The brain has attained its maximum size and weight at the beginning of the period and any further development must be in the nature of differentiation, or development of complexity and functioning power.

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1. Throughout this outline, page references are to this thesis.



This is shown by Vierordt's table, which is accepted by Donaldson as authoritative (page 29).

V. The slow increase of mass during this period affords opportunity for the development of voluntary motor ability and of the coördinations that control the finer muscles.

The development of voluntary motor ability has been studied by Bryan, Gilbert, Burk, and Smedley, and this statement is based upon their results. Corroborative evidence is afforded by Freeman's study of the effect of movement drill in penmanship (pages 33-34).

VI. At about ten to twelve there is a general loss of ability in the various types of sense discrimination.

This is revealed in the experiments by Gilbert (page 37).

VII. Imagination is vivid at the beginning of the period, but by its close has suffered a marked decline.

Experimental evidence of this fact was obtained in studies by Colvin and Myers, also by Kirkpatrick (pages 39-40).

VIII. Susceptibility to suggestion reaches its height at about nine and then rapidly decreases.

This is shown by the results of experimental investigations by Guidi and by Gilbert (pages 42-43).

IX. Concrete imagery falls off during this period and its place is taken by the verbal type.

Colvin is authority for this statement (pages 44-45).

X. The period of the middle grades is not peculiarly a learning or memory period.

Although this statement is contrary to popular opinion, the experimental evidence is overwhelmingly in its support. Smedley found no memory period, and Pyle's table of norms for rote and logical memory shows a steady increase with age. Pohlmann's table shows a steady rise up to fourteen, followed by a period of fluctuation, but memory is shown to be as good at twenty as at thirteen. The excellence of the retentive power at this stage, according to Colvin, is relative rather than absolute (pages 46-50).



XI. Attention, though under better control than in the primary grades, is still of the fluctuating type.

Mrs. Squire presents experimental evidence of this (pages 53-54).

XII. Perception is acute during this period and there is marked development in the power to observe and make report.

The experiments of Bernstein, Winch, and Stern show this development with age through these years (pages 55-58).

XIII. There is little power of consecutive thought or of the use of the concept before about twelve years of age.

This is shown by the nature of the child's definitions, by the results of studies by Mrs. Barnes and Mrs. Squire, Meumann's investigations, Lobsien's study of memory types, and Stern's work on observation and report (pages 58-63).

XIV. At about the time the child enters the fourth grade there begins a plateau of non-development in his work in drawing.

The existence of this plateau has been shown by all the important studies that have been made of children's drawings, especially those by Childs, Lukens, and Burk (pages 65-66).

XV. Movement drills in penmanship are not effective before the fourth or fifth grade.

Freeman's study brought him to this conclusion and corroborative evidence is given by the studies of Burk and Bryan upon the development of voluntary motor ability (pages 33-34, 67).

XVI. Results of the application of tests in arithmetic indicate that the sixth grade represents an area of irregularity.

This was found in the work of Rice, in Courtis's original application of his tests to pupils in his own school, and in a recent application of the Courtis tests in Boston (pages 68-69).

XVII. The fifth grade presents an element of uncertainty or irregularity in the work in spelling.

Cornman and Wallin both come to this conclusion (pages 69-70).



XVIII. The middle grades include the grades most frequently made up, and the ones most frequently repeated.

This is Keyes's conclusion. Miss Schmitt's study revealed the same tendency. Hoskinson finds that the grade most often skipped is the fourth, with the exception of the second, which just equals it in his study (pages 75-76).

XIX. At about the age of eleven, children exhibit a strange similarity, so that sex-differences and differences in intellectual ability tend to fade out.

The tables of height and weight show that at this time boys and girls are about equal in these respects. Pyle found the sexes equal in rote memory at this age. Gilbert found that boys and girls and bright and dull children were nearer together in his tests at this age than at any other (pages 76-77).

XX. There is a definite process of development with age in the choice of an ideal. Throughout this period acquaintance ideals fall off, while public and historical ideals increase in compensating proportion.

All the important studies reveal this, especially those by Chambers, Hill, and Meumann (pages 77-80).

XXI. The interest in making collections reaches its height at about the middle of the period.

Mrs. Burk made a very careful study of this interest and her results are the basis of this statement (page 80).

XXII. The child's interest in himself as an individual reaches its height at about ten or eleven.

Sheldon found the caste feeling highest at this time. Chambers found that the wish for honor, fame, and prosperity culminated at eleven. The special form of the property interest known as the collecting interest reaches its height at ten. Other lines of evidence bear similar implications. (pages 80-82).

XXIII. Circumstances connected with the child on the one hand and the school on the other combine to make the period of the middle grades a drill period.

The child's attention is so fluctuating in the primary grades as to make an impossibility of drill to any considerable extent, and it is only with the middle grades that this can be



begun. In the higher grades, children will not readily submit to the drudgery of drill. The nature of memory in this period is such as to make necessary the method of mechanical repetition without any great use of association. The preparatory value of the knowledge that is given at this part of the school course is so great that it must be mastered without further delay (pages 52-53).

XXIV. The child at this period is not well adjusted to the work of the school.

He has as yet comparatively poor control over his attention. There is at this time a characteristic restlessness which is due to the uncontrolled discharge of unused energy. This restlessness often manifests itself while the child is engaged in the tasks of the school and is here symptomatic of poor adjustment to the object of attention. The desire for change is very strong, and the pupil is extremely likely to find the work of the school dry and uninteresting. (pages 73, 84).

XXV. The two chief factors of disturbance during these years are, on the part of the child, his new sense of individual power, and, on the part of the school, the transition from the psychological to the logical method of presentation.

While the existence of these two factors cannot be doubted, it is, of course, impossible to state which of them exerts the greater force. Indeed, this statement of their importance may seem dogmatic. It is, however, based on experience in dealing with children of these grades. Taken together these two factors serve so well to account for the peculiar disturbances of the middle grades that the conclusion reached above would seem to be justified by the principle of economy of explanation (pages 54, 64, 70-72, 83-85).

The child in the middle grades has conditions of mind and body that are peculiarly and appropriately his own. He is sturdy, healthy, and self-reliant. He has energy at his disposal that he does not know what to do with, and which is constantly seeking an outlet. He is confident of his own ability and willing to attempt almost any task, especially if he feels that he will be benefited by the result. He is lacking in power of sustained attention and is constantly seeking variety of experience, but he is beginning to learn how to hold his attention to the task which must be accomplished.



His imagination is still vivid, but experience is teaching him that things may often be quite otherwise than they seem, and he is beginning to take into consideration surrounding circumstances and contributory relationships which may render a snap judgment inadvisable. His memory is of the retentive, rather than the associative type. His thinking is perceptual or concrete in its nature, for as yet he has but little power of conceptual or consecutive thought. During the first part of the period he is becoming individualized, and at its close he still lacks much of being socialized.



## APPENDIX.

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